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A multi-sensory model

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Designing disruption for social touch, in public spaces of merging realities: a multi-sensory model

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Abstract: Can a multi-sensory model of disruption be designed for shared social touch in public space of merging realities? This paper presents a multi-sensory model for disruption design for shared social touch experience in public space of merging realities. This model is based on analysis of three different artistic orchestrations performed in the public space across the world. In these orchestrations participants' intimate and sensorial experience of social touch is purposefully disrupted and re-orchestrated. These orchestrations are designed to enable participants to feel, see, hear and share a disrupted touch experience, in the social context of the public space. The model provides as frame of reference for designing an experience of shared social touch, for scientists, designers and artists.

Keywords: shared experience of social touch; engagement; digital performance art orchestration; social context; public space; merging realities; multi-sensory model for interaction; design of disruption.

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1 Introduction

Can design of disruption for social touch in merging realities be based on a socio-technological, multi-sensory model for interaction in public space?

Social touch is a multi-sensory experience in which seeing, touching and hearing are synthesised. These experiences are shared between participants in reciprocal acts of touch embodying feelings of intimacy, affection and trust. In physical reality, social touch is vital to physical and psychological well-being, to convey intimate emotions and relations and experiences of togetherness (Van Erp and Toet, 2015; Huisman, 2017).

In today's networked society in which physical and virtual realities often merge, new forms and phases of social-technological experiences are being explored (Latour, 1991, Van der Meulen and Bruinsma, 2018; Turkle, 2014). Social touch interfaces, based on (brain computer) tele-communication between humans, robots and virtual agents for example (van Erp and Toet, 2015; Huisman, 2017) focus on individual (or peer-to-peer) human experiences and less on shared experience.

Less exploration is performed on

1 the influence of social context on situated, embodied experience of shared social touch and the role of emotional and physical vulnerability (Price et al., 2018; Wang et al., 2012; Lomanowska and Guitton, 2016)

2 social touch through purposeful design of disruption (Kwastek, 2013; Benford et al., 2009; Sermon, 1992).

This paper explores disrupted social touch between multiple individuals in the social context of the public space, in artistic orchestrations. In these orchestrations participants' intimate and sensorial experience of social touch is disrupted and re-orchestrated (Lancel and Maat, 2011; Lancel et al., 2019a, 2019b, 2019c, 2019d). These orchestrations are designed to enable participants to feel, see, hear and share a disrupted touch experience. Sensory modalities of touch are transferred to modalities of seeing and hearing. Familiar relations between 'who you touch and who is being touched, what you see and what you hear' are purposefully disrupted and explored for new, digital synaesthetic syntheses (Gsöllpointner et al., 2016).

Analyses of these orchestrations (Section 5) has resulted in a model (Section 4) of shared touch designed

a to design the experience of social touch through multi-sensory disruption and multi-synthesis, with

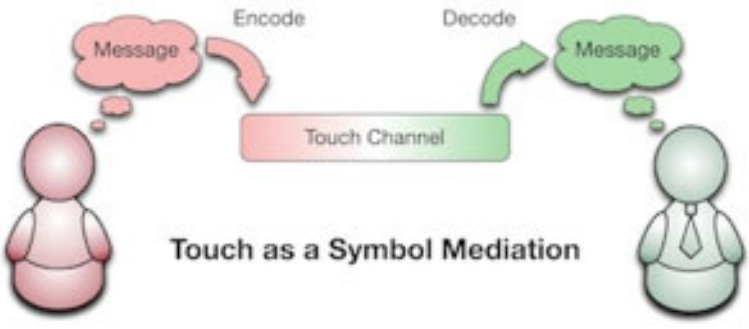
b new forms of disrupted social touch experience in public space.

The interdisciplinary model combines insights of human-human computer interaction (HHCI) design of social touch; of interactive digital performance art and of emphatic touch perception.

2 Related work

Touching another person is an affective and powerful gesture [Huisman, (2017), p.394]. Disruption of 'social' or 'interpersonal' touch [Huisman, (2017), pp.397–399] is currently the focus of research related to the design of remote and prosthetic interfaces. Until quite recently, research and design has focussed on information processing or 'message passing' (Figure 1) of touch signals, using haptic and kinetic devices for touch experience such as pressure, movement, vibration, skin stretch and warmth; through thermal signals (Willemse, 2018), intimate sexually touching (Gomes and Wu, 2017; Solon, 2014, Kiiroo, https://www.kiiroo.com/), stroking a hand (Eichhorn et al., 2008) or an arm (Huisman et al., 2016), hand holding (Gooch and Watts, 2012), emotion transmitting (Bailenson et al., 2007), hugging (Rosella and Genz, 2006), brain computer interfaces (Lupu, 2018). Such research and design primarily focus on imitation of tactile qualities, efficiency, immediacy, categorisation, automatisation and user experience.[1]

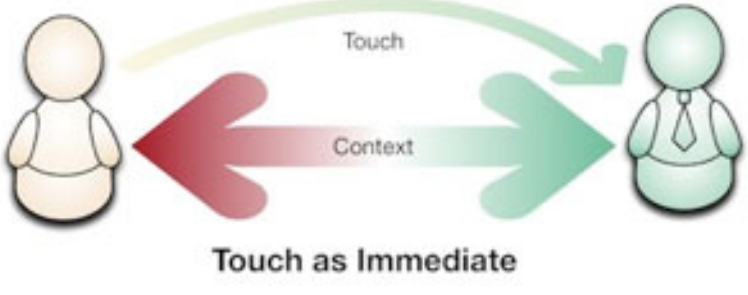
Figure 1 Model of mediated touch, as message passing (see online version for colours)



Source: Wang et al. (2012)

Currently, research and design is also exploring the influence of other senses on the experience of touch with multi-modal interfaces [Huisman, (2017), p.399]. For example, through combining remote story telling with remote touch signals, feelings of being close and connected can be enhanced for the listener (Wang et al., 2012). Through touching on 'emotional high points' in the story, a listener can emotionally connect 'with the emotional view point of the story teller' (Figure 2). The context of social touch,[2] has shown to be crucial to appreciation, sense making and clarifying meaning of touch (Van Erp and Toet, 2015).

Figure 2 Model of disrupted social touch in social context (see online version for colours)



Source: Wang et al. (2012)

These research perspectives dominantly focus on the users' perceptual experience of 'direct' social touch. The actual touch signal is performed by devices known as 'touch prosthetics', to facilitate a user experience that is seemingly not disrupted by what is, in fact, disrupted touch through tele-matic technology interaction (Lombard and Jones, 2013).

Another approach, in which human-computer interaction is designed as an obvious part of the social touch experience, can be found in digital interactive performance art. Disruption of direct experience (of social touch) is embraced as an aesthetic design principle. Often, familiar visual, haptic and auditory relations are disrupted and re-orchestrated, for new digital synaesthetic syntheses (Gsöllpointner et al., 2016) to emerge. The aesthetic principle of disruption guides the design, to support ambivalent perception of touch and experience of being immersed.

In public spaces where individuals share a haptic experience, ambivalent perception of touch, through direct and disrupted connections, can be instrumental to shared engagement and to reflection. Such ambivalent perception can be designed on the basis of, for example, familiar and unfamiliar experiences and unpredictable connections (Benford and Giannachi, 2012; Kwastek, 2013; Blast Theory, 2007; Lozano-Hemmer, 2001). Such 'relational interfaces' (Gill, 2013) are designed to support shared exploration of embodied experience, personal knowledge and dialogue, through movement, negotiation, synchronising of rhythm and play.

In such orchestrations, perception of someone 'being touched' has been described as 'vicarious interaction' (Kwastek, 2013). This form of embodied spectatorship is explored to resonate social empathy and connectedness (Freedberg and Gallese, 2007; Martin, 2018; Ward, 2018).[3]

In such performances, public participants often take roles of actors approaching a performer's body (Kwastek, 2013; Lancel et al., 2019c), challenged to hold, caress or even abuse a performer's body 'as an interface'. These orchestrations are, in fact, designed to negotiate new social relations of vulnerability, responsibility and trust (Cheang, 1998; Cillari, 2006–2009; Dikker and Oosterik, 2011–2016; Lancel/Maat, 2000–2019; Sermon, 1992; Stelarc, 2015; Vlugt, 2015).[4] Augmentations of physical experience of touch, combined with VR visual pre-recordings of touch, have for example been designed to purposefully evoke confusion between self and others (Crew, 2016), based on the enfacement illusion[5] (Tajadura-Jiménez et al., 2012). Such orchestrations expose haptic gestures and relations in real life and/or on (networked) public screen(s), in unfamiliar and unpredictable ways for which the public takes on the role of spectator, witnessing the performers experience (Benford et al., 2012; Lancel et al., 2019c; Lomanowska and Guitton, 2016; Verhaeghe, 2018).[6]

In these performances, the performer's body is integrated in the interface's, functioning as a 'relational interface module' (Reeves et al., 2005). Although members of the public touch the performer's body, they are not touched themselves, nor do they touch others. Performances for shared social touch in which touching and being touched are orchestrated for participants of the public in interplay with each other (Lancel/Maat, 2000–2019) are less common. To understand the design space for shared social touch in public space this paper analyses the effects of design choices in three artistic orchestrations designed to this purpose. A multi-sensory model for disruption for shared social touch in public space of merging realities is proposed.

3 Artistic orchestrations

This paper analyses three artistic orchestrations that have been designed as immersive, engaging environments in public space for shared multi-modal computer interaction, through shared social touch. In all orchestrations participants are requested to touch or caress themselves and/or each other in public spaces. To this purpose, reciprocal touch is often replaced by acts of self-touch. The person who touches and feels to be touched, does not have to be the same (tele-matically present) person to whom the haptic connection is attributed (Lancel et al., 2019c). For example, the person to whom the touch is visually attributed, can be visible on a screen. The three orchestrations have been designed to be both 'expressive' and 'magical' (Reeves et al., 2005), to prompt reflection on affection. They have been visually designed to attract and invite people to participate

with 'expressive' interfaces. 'Magically', sensory data are translated to other sensory modes, they emerge as digitally disrupted and semi-unpredictable effects. Pairs of direct touch and disrupted touch are exposed to evoke ambivalent perception.

The orchestrations are described in more detail in Lancel and Maat (2011), Lancel et al. (2019a, 2019b, 2019c, 2019d) and Lancel/Maat (2000–2019). Note, that all three artistic orchestrations are, in fact, hosted performances. The role of the host is described in Lancel et al. (2019a, 2019b, 2019c, 2019d) but has not been included in the models presented in this paper.

This paper focuses on analysing and evaluating the effects of disruption of the sensory connections, and their re-alignment (for new syntheses to emerge). A model for design of disruption to facilitate social touch in merging realities based on these results is proposed in the next section.

4 A model for disruption of social touch in merging realities

This chapter describes a model for design of disruption to facilitate social touch in public space of merging realities, in

a 'a social context' in which

b disrupted sensory connections are embedded, in line with Figure 2.[7]

The model is based on three orchestrations in public spaces described in more detail in Section 5. Disrupted social touch between multiple individuals in co-located public space is core to these orchestrations.

4.1 Social context: 'touch and respond'

The social context consists of members of the public space. As actors or spectators, they experience interdependent, reciprocal connections of 'touch and response'. These connections are designed to enable shared experience of

a physical vulnerability of (vicarious) reciprocal touch

b responsibility to support self-revealing through touch

c mutual attuning, through touch.

To this purpose, unfamiliar and unpredictable forms of reciprocal touch have been designed, in which active touching is direct related to 'feeling to be touched'. Performance of touch is exposed and hosted though dialogue, to direct both the actors' and co-located spectators' attention inwards, on affective and embodied experience.

4.2 Multi-sensory design for disruption

Sensory perception of 'social touch' (Figure 3) is based on a synthesis of direct haptic, audio and visual face-to-face connections. These connections are partly disrupted and transferred to new connections via a screen and a database, depicted in Figure 4.

Figure 3 Direct social touch: a synthesis of reciprocal sensory connections, including tactile, audible and visual connections

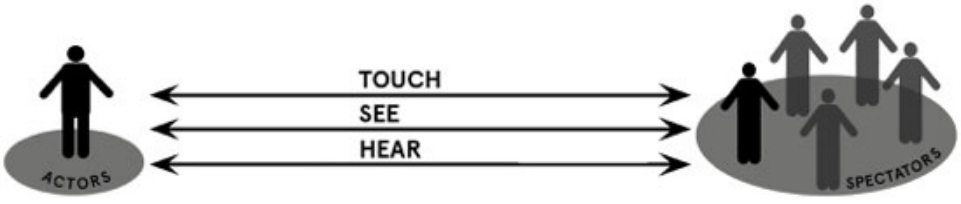
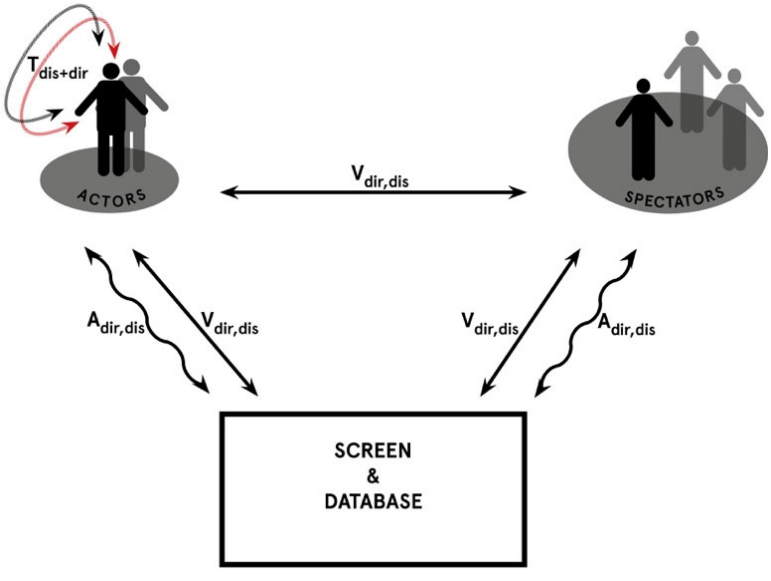


Figure 4 Interaction model for disruption for social touch in public spaces of merging realities (see online version for colours)



Notes: The multi-sensory, reciprocal connections of social touch are direct (dir) or disrupted (dis); tactile (T_{dir} or T_{dis}); visual (V_{dir} or V_{dis}) and auditory (A_{dir} or A_{dis}).

In new, multi-sensory syntheses, connections are unfamiliar, unpredictable and ambivalent. The design of touch is unfamiliar and the resulting data-visualisations and data-audifications emerge and merge in unpredictable ways. Ambivalently, for participants, direct reciprocal activities are connected to real-time emerging data-representations.

In all three models, design of touch is both direct and disrupted. However, in each model, visual and audio connections are orchestrated differently, combining direct and disrupted connections.

Figure 4 depicts actors, who reciprocally touch each other or themselves. Their acts of touching are both direct and disrupted through sensors. The censored interaction has been designed on the basis of self-touch, via face recognition technologies in a mirror screen (orchestration 1); self-touch, in a smart textile body covering veil (orchestration 2); kissing each other, while wearing EEG headsets (orchestration 3). Through touch,

disrupted visual connections are created (of which data representations are stored in the database) and made visual on the screen.

Reciprocal connections between actors and spectators are either direct or disrupted. Visual disruption can be established by physically covering or closing participants' eyes or through digitising and transferring touch, into a visualisation to the database or on the screen.

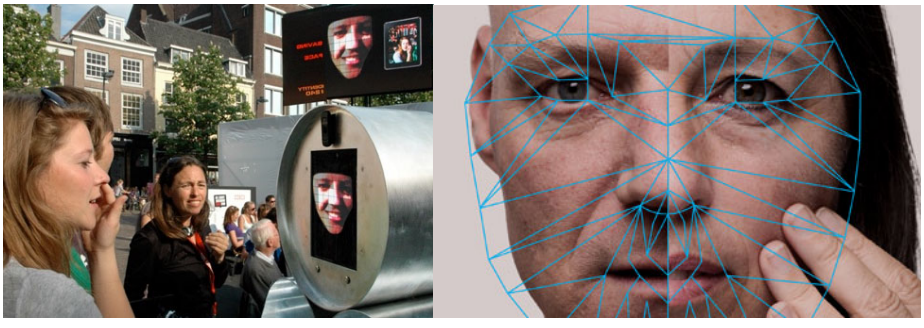
5 Three artistic orchestrations

This section analyses three artistic orchestrations to answer the question: Can design for disruption of social touch in merging realities be based on a socio-technological, multisensory model for interaction in public space?

5.1 Artistic orchestration 1: Saving Face

The Saving Face (Lancel/Maat, 2012) orchestration[8] makes use of face recognition technologies to enable actors to connect with others in the public space, on a public screen and in the digital network, guided by a host.

Figure 5 Saving Face (see online version for colours)



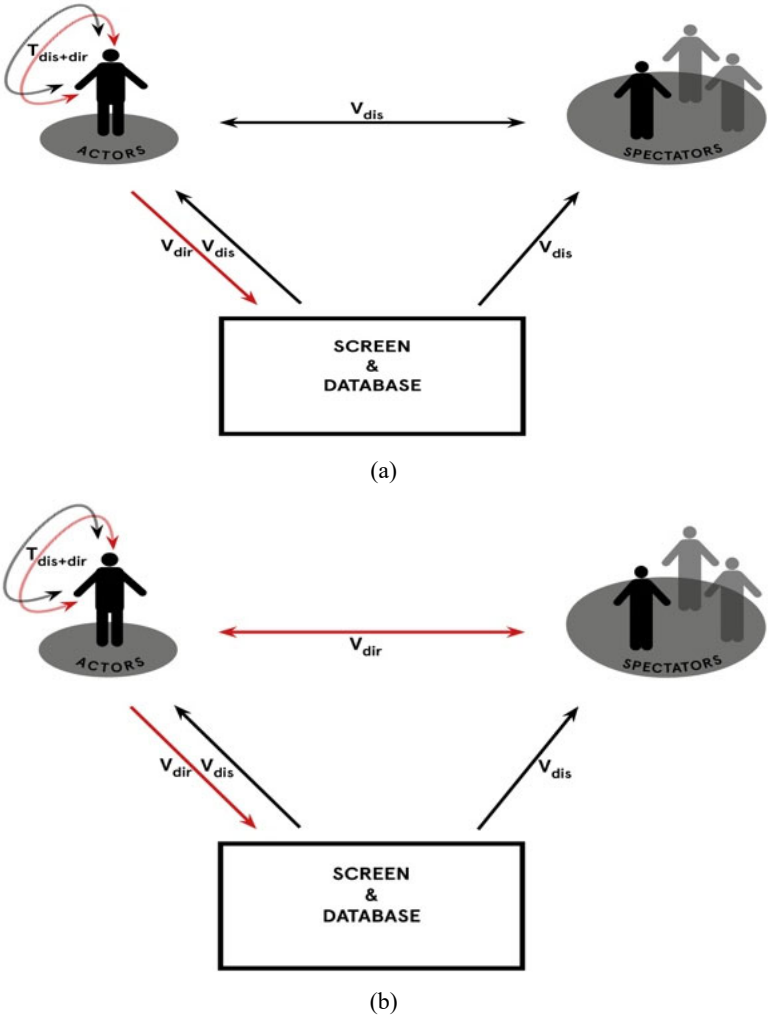
Actors are invited in front of an interactive sculpture including a computer, a camera and face recognition technologies, connected to a screen. By caressing their faces, actors 'paint' their portraits on the public screen. After their portraits have appeared on the screen, actors can choose to slowly merge their portraits with the portraits of previous visitors acquired in the same way. In this way, over time, actors co-create visual, unpredictable and untraceable networked 'identities', as virtual personae on a screen. Each composed identity is saved in a participant data generated database from which

a composed identities are shown auto play when no interaction occurs

b composed identities can be downloaded by participants for future reference.

Examples of participants describing their experiences of social, corporeal connections: 'this a technological but sensitive me' and 'I feel merged with other people'. Saving Face is described in more detail in Lancel et al. (2019a, 2019b) and Lancel/Maat (2012).

Figure 6 Interaction models of orchestration 1, Saving Face (2012) (see online version for colours)



Notes: Sensory connections between actors-spectators are direct (dir) of disrupted (dis). Connections include: tactile (T_{dir} or T_{dis}); visual (V_{dir} or V_{dis}) and auditory (A_{dir} or A_{dis}).

5.1.1 Model 1: artistic orchestration 1: Saving Face

In model 1, depicted in Figure 6, unfamiliar touch connections and visual face-to-face connections are both direct (T_{dir}, V_{dir}) and disrupted (T_{dis}, V_{dis}). Ambivalently, touch gestures are both direct and disrupted. The touch gestures are visually exposed (V_{dir}) and transferred to a data-visualisation on screen, for all to see (V_{dis}). Spectators can ambivalently watch both caressing gestures (V_{dir}) and emerging data visualisation (V_{dis}). From the database, data-visualisations (self-representations of previous and actual participants), are exposed in disrupted, unpredictable connections (V_{dis}), emerging from self-touch.

5.1.2 Design process

Two Saving Face orchestrations are depicted in Figures 6(a) and 6(b).

In the first orchestration, co-located spectators were standing behind the actors, invisible to actors. In fact, direct face-to-face connection was disrupted. This orchestration did not lead to the shared experience for which it was designed. Actors described the experience of caressing as purely instrumental to producing a portrait on the screen, transforming Virtual Personae, with little engagement from the public.

In the second orchestration, the spatial design was adapted. Instead of standing behind the actors, spectators were invited to stand around the interactive sculpture facilitating direct visual face-to-face connection between actors and spectators. Actors could then see reactions to their caressing gestures, gesture tracing on screen, and on the resulting shared virtual persona.

Adding these direct face-to-face connections between spectators and actors was successful for the experience of social touch. Even though some actors indicated that they 'lose touch with surrounding apectators' while caressing, the exposure and witnessing presence of the spectators' are needed to make the interaction socially meaningful.

Immersion (of both actors and spectators) is only experienced if both screen and caressing gestures can be seen or experienced from one spatial position.

5.1.3 Discussion

Saving Face has shown that a new sensory social touch synthesis can be based on disrupted connections when reciprocal touch is replaced by direct and disrupted self-touch, supported by direct and disrupted visual face-to-face connections.

Characteristics of this touch synthesis are that:

1 all direct and disrupted connections are attuned through synchronisation, with clear reference points in time

2 touch connections, direct and disrupted, by actors, that replace reciprocal caressing by self-caressing (censored)

3 visual connections, direct, to spectators: that result in direct visible exposure of the self-caressing acts and the performers experience

4 visual connections, direct and disrupted, shared by all, are supported by visual resemblance of face-to-face connection

5 visual connections, disrupted, shared by all, result in unfamiliar and semi-unpredictable visual data-feedback

6 visual connections, disrupted, shared by all, that evoke visual participant responses, that are collected over time.

In addition, co-presence of actors and spectators is conditional to co-creation and shared, intimate experience of touch. All actors and spectators can see each other and the screen from one position. Seeing each other and the data representations on the screen from one position creates ambivalent sensory connections, vital to aesthetic distance. The new connections must evoke imagination and personal form of sense-making. Moreover, unfamiliar and unpredictable connections must evoke a personal form of sense-making,

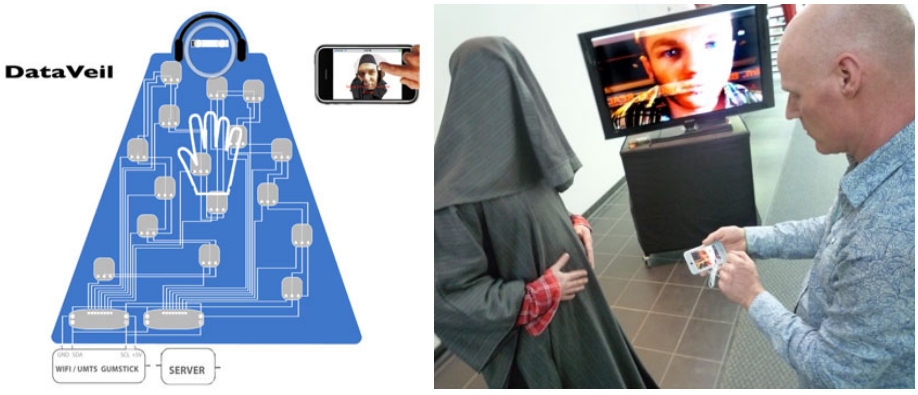
vital to emphatic response. A database with shared participant contributions is instrumental to sharing of disrupted responses over time by all.

5.2 Model 2: artistic orchestration 2: Tele_Trust

In the Tele_Trust (Lancel/Maat 2009) orchestrations,[9] actors wear full body covering 'data-veils'. While the veil covers the face of the actor, the veil's smart textile interface with touch sensors allows connection with others. Through caressing their 'bodies as interfaces', actors and spectators can connect in the public space, through smart phones, on a screen and in the network (Figure 3). Before veiling, the actors faces are visually portrayed and added to a digitally networked database. Spectators can visually 'unveil' these digital portraits on their smart phones and respond on what they see with a spoken message to the question: 'Do you need to see my eyes to trust me?'. Actors can hear the spectators voices, audible in their headsets, as a result of touching and of feeling to be touched. Through caressing their bodies, the co-created database randomly exposes portraits of (actual and previous actors), randomly combined with transcriptions of the auditory messages. Examples of participants describing their experiences of social, corporeal connections: "When I touch myself, I am together with others, when I hold off, I am alone" and "I could hear your voice in my skin. I remembered you remembering. My body is your body." (Lancel et al., 2019b).

Tele_Trust is described in more detail in Lancel and Maat (2011) Lancel et al. (2019c) and Lancel/Maat (2009).

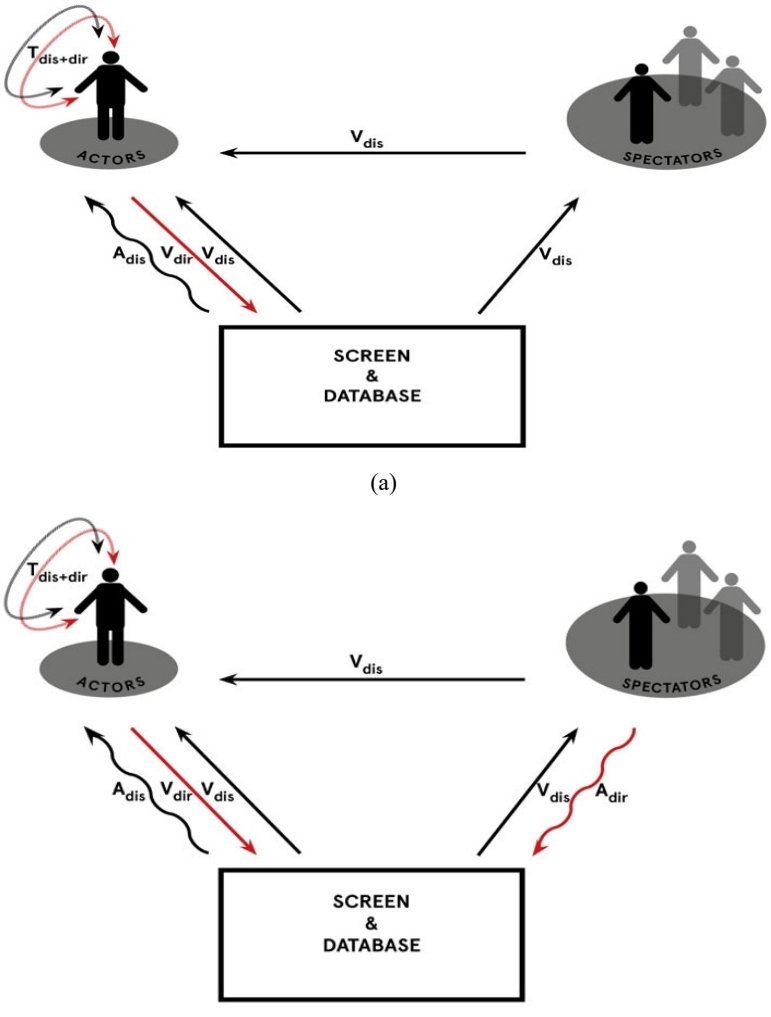
Figure 7 Tele_Trust 2009 (see online version for colours)



5.2.1 Model 2: orchestration 2: Tele_Trust

In model 2, depicted in Figure 8, tactile connections are both direct and disrupted. In contrast to model 1, visual face-to-face connections (V_{dis}) are disrupted and supported by direct and disrupted auditory connections (A_{dis}, A_{dir}). Actors see the spectators faces but spectators cannot see the actors faces. Self-touch is transferred to data-visualisations, with data-audifications, which in turn are made visible and audible through self-touch on the screen. These data-visualisations and data-audifications (self-representations of previous and actual participants stored in the database), are exposed in disrupted and unpredictable connections (V_{dis}), though self-touch.

Figure 8 Interaction model of orchestration 2: Tele_Trust (2009) (see online version for colours)



Notes: Shows sensory connections between actors-spectators that are direct (dir) of disrupted (dis).Connections include: tactile (Tdir or Tdis); visual (Vdir or Vdis) and auditory (Adir or Adis) connections.

5.2.2 Design process

In the first orchestration, depicted in Figure 8(a), actors could hear spectators responses based on previous recordings through their headsets, and see transcribed audio responses on the screen. This first orchestration did not achieve the shared experience of connection and immersion for which it was designed. Immersion was achieved for actors but not for co-located spectators. Interdependent connections between actors and spectators were not established.

In the second orchestration, depicted in Figure 8(b), co-located spectators were enabled to directly send audio-responses (mediated through an interviewing host), audible for actors in their headsets real time. Spectators followed actors and their caressing gestures, interacting with the actors through mediated audio-responses, visible on the screen, and discussing the events with other co-located spectators. Actors and spectators expressed they now experienced interdependent connections.

In a third orchestration, a smart phone app was used to transfer audio responses. Spectators only felt connected with actors if a visual representation of the actor (e.g., a portrait) accompanies the app's text environment.

5.2.3 Discussion

Tele_Trust has shown that a new sensory social touch synthesis can be based on disrupted unfamiliar connections if reciprocal touch is replaced by direct and disrupted self-touch, supported by disrupted visual face-to-face connections and by direct and disrupted auditory connections.

Characteristics of this touch synthesis are that:

1 all direct and disrupted connections are attuned through synchronisation, with clear reference points in time

2 touch connection, direct and disrupted, by actors, that replace reciprocal caressing by censored self-caressing

3 visual connections, direct, to spectators: that results from direct visible exposure of the self-caressing acts and the performers experience

4 visual connection, disrupted, to spectators, that support by visual resemblance of face-to-face connection

5 supporting auditory connections are individually perceived by actors (disrupted, synchronised) and responded by spectators (direct, not synchronised)

6 visual connections, disrupted, shared by all, that are evoked by semi-unpredictable and unfamiliar visual and transcribed audio connections, collected over time.

In contrast to model 1, direct eye contact is disrupted and replaced by auditory, disrupted participant responses, that are individual and not synchronised. Both visual and transcribed audio responses are collected over time and shared by all.

5.3 Artistic Orchestration 3: EEG KISS

In the EEG KISS (Lancel/Maat, 2014) orchestrations,[10] participants are invited to feel, see, touch and share an intimate kiss as an aesthetic and a sensory experience. Members of the public are invited to close their eyes and kiss while wearing EEG headsets. The actors' 'kissing' brain activity is measured and made visible as EEG data. Spectators are invited to watch the ambivalent orchestration, to simultaneously experience the kiss and a floor projection encircling the kissers with their real-time streaming EEG data. The data are 'translated' into a music score generated by the brain computer interface (based on an algorithm design) for a real-time soundscape. All soundscapes are shared in a database from which actors and spectators can download each other's 'kissing portraits'. Examples

of participants describing their experiences of social, corporeal connections: "I could see the kiss being mirrored in the data visualization. Although in fact I don't know what I was seeing, I felt I could see it"; "Only we know what these traces mean" and "The sound made the kiss more intense and more focused. The tickling sound, that emerged from my brain activity, made me imagine electric rain drops that enhanced and merged with my experience of electrified kissing." EEG KISS is described in more detail in Lancel et al. (2019d) and Lancel/Maat (2014).

Figure 9 EEG KISS 2016 (see online version for colours)

5.3.1 Model: Orchestration 3. EEG KISS

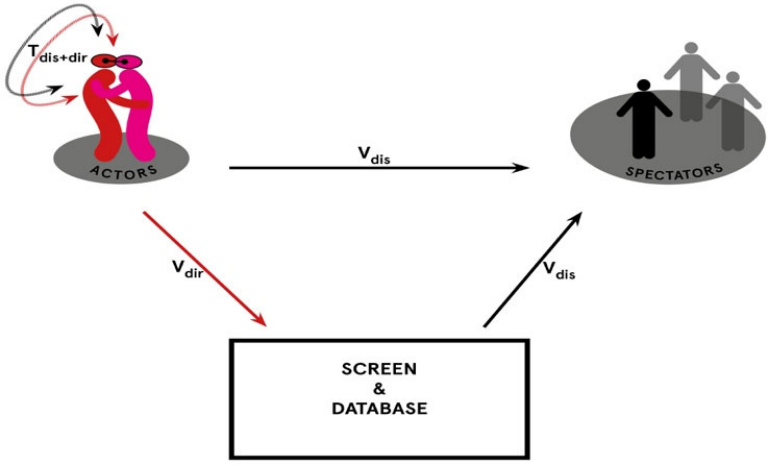
In model 3, depicted in Figure 10, tactile connections are both direct and disrupted. Different from models 1 and 2, visual face-to-face and auditory connections are both disrupted (V_{dis}, A_{dis}). Actors do not 'self-touch' but instead kiss each other (T_{dir}) while wearing sensors (T_{dis}). Similar to model 2, visual face-to-face connections are disrupted, but differently, spectators see the actors (during kissing) while actors do not see the spectators. Again, disrupted visual face to face connection is supported by data-audification, but differently, this is audibly shared by actors and spectators.

5.3.2 Design process

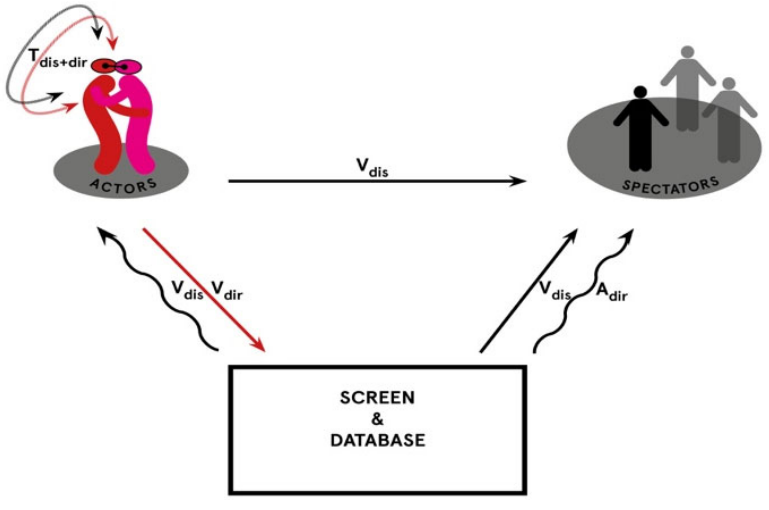
In the first orchestration, depicted in Figure 10(a), acts of kissing and the data-visualisation of the acts of kissing are exposed to the spectators. During this first orchestration, actors were shown to need to concentrate and reflect with closed eyes for some time before and after their kissing acts, to establish meaningful connections between kissing acts and resulting data for spectators.

In the second orchestration, depicted in Figure 10(b), real-time translation of EEG data to sound feedback was added to strengthen the intimate connection between actors and spectators. The added shared data-audification was perceived by many actors to strengthen their connection, merging with their kissing experience. The combination of spatial data visualisation and shared sound enhanced their embodied connection with the BCI data for spectators. It increased participants' feeling of safety and immersion, both in time and in intimate connection with each other.

Figure 10 Interaction model of orchestration 3: EEG KISS (2016) (see online version for colours)



(a)



(b)

Notes: Shows sensory connections between actors-spectators that are direct (dir) of disrupted (dis). Connections include: tactile (Tdir or Tdis); visual (Vdir or Vdis) and auditory (Adir or Adis) connections.

5.3.3 Discussion

EEG KISS has shown that a new sensory social touch synthesis can be based on disrupted, unfamiliar connections if reciprocal touch is replaced by direct and disrupted touch, supported by disrupted visual connections, direct and disrupted face-to-face touch connections and auditory connections. Characteristics of this social touch synthesis are that:

1 all direct and disrupted connections are attuned through synchronisation, with clear reference points in time

2 touch connections, direct and disrupted by actors, that are established in kissing each other while censored

3 visual connections, direct for spectators, by visible exposure of kissing acts and the performers experience

4 visual connections, disrupted for spectators, that are supported by disrupted, semi-unpredictable, abstract visual connections

5 auditory connections, disrupted, shared by all, that are supported by disrupted, unpredictable auditory feedback

6 visual and auditory connections, shared by all, supported by a database collecting and presenting participants' responses over time, accessible to be downloaded by all.

In contrast to models 1 and 2, both visual and auditory participant responses are disrupted. Direct eye contact is disrupted, but in contrast to model 2, an abstract data visualisation connects the actors' kissing acts to the spectators visual perception. In this case, disrupted, synchronised auditory support needs to be shared by all. Clear synchronisation reference points in time are related to the acts of kissing, but disrupted visual and auditory connections are unpredictable, based on spontaneous brain wave interaction.

6 Discussion and conclusions

Can a multi-sensory model of disruption be designed for shared social touch in public space of merging realities? This paper presents a multi-sensory model for disruption design for shared social touch experience in public space of merging realities (Section 4), based on three different artistic orchestrations performed in public space across the world (Section 5). In the social contexts of public space, the orchestrations are designed to enable shared interdependent experience of

a physical vulnerability of (vicarious) reciprocal touch

b responsibility to support self-revealing through touch

c mutual attuning, through touch.

Analyses of these orchestrations show that shared social touch can be based on ambivalent, unfamiliar and unpredictable syntheses. These syntheses must evoke imagination and a personal form of sense-making, as a vital component of emphatic response to touch.

In these orchestrations, direct touch is replaced by a combination of touch, visual and auditory connections, direct and disrupted. Characteristics of this disrupted touch design are:

1 Direct and disrupted, unfamiliar gestures of reciprocal (self-)touch are visibly exposed. These touch gestures must evoke empathy and affection, shown in all orchestrations.

2 All connections need to be attuned through synchronisation.

3 Direct eye contact can be replaced by a combination of audio and visual representations (shown in orchestrations 2 and 3), however, participants must always be enabled to perceive both each other and the data visualisations from their individual positions (shown in orchestration 1).

4 A data repository is needed to share data representations and responses over time.

The proposed multi-sensory model of disruption for shared social touch is anchored in the orchestrations, discussed in this paper. It provides a frame of reference for scientists, designers and artists.

The role of the host in these models is subject of current research, as is shared empathy and aesthetic perception as neurological processes.

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- Lancel/Maat (2000–2019)
- Lancel/Maat (2009)
- Lancel/Maat (2012)
- Lancel/Maat (2014).

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Notes

1 Touch experience for social affection was explored using vibro-tactile technologies. Participants associate tele-matic, haptic experiences of slow (1–10 cm/s), gentle stroking of the body, such as caressing, with experiences of affection (Huisman et al., 2016).

2 The context of social touch includes for example location on the body and relations to cultural and social factors [Huisman, (2017), p.391].

3 Related to this artistic research, in the domain of neurology, mirror neuron activity of touch is considered to enhance empathy (Ward, 2018). In specific cases of 'mirror touch synaesthesia', precarious touch experience is perceived stronger if the spectators' neurological systems show 'lower thresholds' (Ward, 2018; Martin, 2018).

4 Safety to expose vulnerable, haptic relations and shared reflection is facilitated through a form of public guidance. Public participants are (individually) guided through different socio-technological 'stages' (Loke and Khut, 2014) or 'interactional trajectories' (Benford et al., 2009). These trajectories and stages are in fact distinct moments and safe, public environments, designed for engaging, explaining and facilitating experience. Afterwards, hosts facilitate de-briefing, sharing interpretation and dialogue (Fosh et al., 2013; Kwastek, 2013).

5 'The enfacement illusion': through mirroring in a screen based mirror in which the face of a stranger is caressed in synchronisation, self-recognition and self-identification of the participant is confused. As a result, close connection to the stranger is experienced by the participant.

6 Bonding, social interdependency (Berlant, 2008; Butler, 2017) and negotiation of trust (Roeser et al., 2018; Nevejan, 2007) are all essential to the design of these experiences.

7 Note, that Figure 2 shows a tele-matic form of touching, while the model in this chapter combines co-located and tele-matic connections.

8 Saving Face was orchestrated internationally in museums, urban public spaces and theatres, including: Rijksmuseum Amsterdam 2013; Connecting Cities Berlin/Dessau 2013; 3th TASIE Art & Science exhibition, Science & Technology Museum Beijing 2013; Beijing Culture Art Center BCAC 2015-2016; 56th Venice Biennale 2015.

9 Tele_Trust was orchestrated internationally in museums, urban public spaces and theatres, including: Waag Society Amsterdam 2009; V2_Institute Rotterdam 2009; Banff Center Canada 2010; Dunedin NZ 2010; Shanghai World Expo 2010/The Mobile City; Festival aan

de Werf Utrecht 2011; IASPIS Helsinki 2011; ISEA 2011 Istanbul; Stedelijk Museum Amsterdam 2011; Delft University of Technology 2012; Gogbot Enschede 2012; Transmediale Berlin 2016; Kunstverein Frankfurt 2017.

10 EEG KISS research process, performances and installations were orchestrated internationally in (semi-) urban public spaces, theaters, museums: Waag Society Amsterdam 2014, 2016; EYE Film Institute/Beyond Biennale Amsterdam 2014; Tsinghua University Beijing 2014 TASML Lab; Baltan Laboratories Eindhoven 2014–2016; Gogbot Enschede 2015; University Vienna – AIL Lab 2016; Frascati Theaters Amsterdam 2016; ISEA 2016 Hongkong; RIXC Riga 2016–2018; Beall Center for Art + Technology 2016 Irvine USA; Ars Electronica Export Berlin 2017; Stedelijk Museum Amsterdam 2017; TU Twente and Thinscon Amsterdam 2017; Science Lab Dublin 2017; Haus for Electronic Art HeK Basel 2018; 'Robot Love'/Dutch Design Week Eindhoven DDW 2018; Ars Electronica Linz 2018; RIXC Riga; European Media Art Platform EMAP 2018; ISEA Gwanju South-Korea 2019; NFF Utrecht Netherlands Film Festival Interac-tive2019; TASIE Tsinghua University Beijing 2019.