E.E.G. KISS:
Shared Multimodal BCI Experience

Karen Lancel, MSc
Delft University of Technology
Artist studio Lancel/Maat
Amsterdam, NL
lancel@xs4all.nl

Hermen Maat
Artist studio Lancel/Maat
Amsterdam, NL
maat@xs4all.nl

Prof. Dr. Frances Brazier
Systems Engineering Group
Faculty of Technology, Policy and
Management,
Delft University of Technology
f.m.brazier@tudelft.nl

Abstract

This paper explores the design space for shared intimate experience of Brain Computer Interaction (BCI) for mirror processes and reflection.
Two experiments in BCI-mediated Artistic Social Labs, in which participants (actors and observers), interact with multi-modal representations of EEGs of kissing, provide new insights on the design of disruption and engagement for reflection, providing new forms of mirroring in shared space.
These results are fundamental to the social construction of BCI based, trans-human embodied cognition and relations, as well as for future BCI communication design and mirror-processes.

Author Keywords

Performance interactive art, neurobiological art, shared multi modal BCI, shared reflection and expression, mirror process, synchronization, connectedness, sensory disruption, aesthetics of interactive art, co-creation, public intimacy, data patterns, agency, engagement, trust, digital art, playful environment, trans-human social construct, EEG data visualization, sonification.

Lancel / Maat

E.E.G. KISS

Introduction

"There is no such thing as a disembodied mind. The mind is implanted in the brain, and the brain is implanted in the body. The self is a perpetually recreated neurobiological state." (Damasio, A. (2003))

Current brain computer interfaces (BCI) enable the design of shared neuro-feedback systems, to study collective emotions, synchronization and connected-ness. Such BCI designs are based on joint sensory experiences for various participants. Current multi-party, multi-modal BCI systems include data visua-lization and sonification feedback systems for shared engagement in public spaces, multi-user affective BCI for shared music choices, telematic language recognition systems, artistic systems that focus on the user's agency for synchronization and for engagement (Dikker, S. et all (2011); Lancel/Maat (2014); Mori, M. (2003); Nijholt, A. & Chang S. Nam, (2015)).[1]

---

[1] https://eaglescience.nl/?portfolio=art-designed-through-emotions

Socially, such interfaces merge various bio-feedback mirror processes, in on- and offline realities. Sensory mirror processes based on face-to-face connection and touch are disrupted and (partly) based on neurobiological measurements. Research to improve such feedback systems include issues of automation and efficiency; interfacing practice protocols (Galloway); aesthetic, immersive design; and user affective states, challenges and satisfaction.

This paper questions: 'Çan shared BCI mediated experience be designed, for shared expression of reflection through mirroring?' The assumption behind this question is that in the near future, intimate relations and mirror-processes will be increasingly framed and shaped by interaction through 'intimate technologies', such as BCI. Shared expression of reflection is fundamental to the social construction, of what can be called BCI based, trans-human embodied cognition and relations', as well as for future BCI communication design and mirror-processes. (Butler, J. (1990), Zwart, H. (2017)).'

How does your kiss feel in E.E.G. data?
To explore the research question, BCI mediated 'Artistic Social Labs' (ASL) have been designed and internationally orchestrated in different settings. This paper presents the results of 2 artistic experiments that explore shared experience of mirroring and reflection between actors, observers and multi-modal EEG data of intimate kissing in the ASL's. In unfamiliar, imaginary forms of embodied awareness, empathy, responsibility, engagement and trust emerge. Within an ASL, aesthetic sensory disruption is designed for reflection, with public co-researchers and 'dancing data' as co-actors in a new type of 'dialogue space' (Kwastek, K. (2013)).

E.E.G. KISS II
Stedelijk Museum
Amsterdam, 2017

Artists Motivation

Aesthetic principles for Reflection. The ASLs in which the BCIs are hosted, orchestrate reflection on experiences of disruption of synchronization, engagement, connectedness, data-appropriation and -interpretation. Sensory relations between hearing, seeing, touching and haptic components are re-orchestrated in a new synthesis to enable participants to intimately relate in unfamiliar coherence, for a sense of communion and reflection (Hansen, M. 2006)).

Kiss to connect. In interactive media art theory, such relational, disrupted sensory perception has been described as 'digital synaesthesia' and 'collective embodiment through technology' (Gsöllpointner, K. et all (2016); Hansen, M. (2006)). However, disrupted relations between seeing and touching, in joint BCI's, is underexplored.

This absence in research allows *firstly*, to create a new BCI mediated coherence between seeing, hearing and intimate touch, for shared experiences.
Lancel/Maat propose that participants experimentally kiss each other to connect with observers and thus be part of a 'communal neuro feedback system for kissing'. The familiar relation between 'who you kiss and who is being kissed, what you see and what you hear' is disrupted, for a new reflective synthesis.

Secondly, to explore the effects of shared BCI interaction between actors, observers and EEG data, a vulnerable act of sharing an intimate BCI mediated kiss in public and consequently very personal data are shared as a means for social bonding (Butler, J (2017)). Reflection is embraced through dialogue with and between participants about personal reflection and shared expression of the newly acquired embodied experience, relating to:
*How does your kiss feel in E.E.G. data?*

EEG interface. In the ASL, although EEG systems measure mostly muscle movement, they are also part of reciprocal intimate processes, including motoric intention in the brain.

Figure 3. Model ASL
'E.E.G. KISS',
© Lancel / Maat and
Matusiak, 2018.

(A) E.e.g. headsets
(B) Screen/projection
(C) Host

(1) Actors kissing
(2) Realtime kissing data
(3) Observers (who are
      potential Actors)
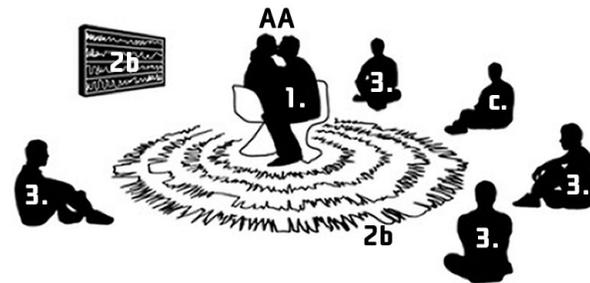
Two Experiments
To answer the question: "Çan shared BCI mediated experience be designed for shared expression of reflection through mirroring?", two artistic experiments have been hosted in BCI mediated ASLs, answering two more specific questions:

1.
Can BCI mediated, disrupted mirror processes lead to a new synthesis for reflection?

2.
Can joint BCI mediated mirror processes be designed for shared expression of reflection?

ASL Experiment 1: Artistic Social Lab
ASL 1 took place at the 'Reality Shift' exhibition, Discovery Festival, Tolhuistuin Amsterdam, 2016. 14 Couples participated.

For this experiment, the act of kissing was deconstructed, to reconstruct a BCI mediated, 'communal kiss'. Participants connect simultaneously in tangible and virtual realities, to feel, see, touch a kiss experience.

Technically, the ASL consists of 2 IMEC e.e.g. headsets (A), with 6 contact-points on the scull: 3 points for measuring motory intention; 1 for arousal/valence, 2 reference sensors. A multimodal, open source system relates EEG data to a joint data visualization on two individual screens.
Spatially, a small low stage allows Observers to gather around. On this stage are two opposite chairs, 'a love seat', where Actors can take place.
Two screens are placed alongside the stage.
Socially, the BCI interface invites people to participate in either the role of an Actor (to describe an *active* rather than *passive* role), or that of an Observer. The third role is assigned to brain data as an active "participant" in the interaction.

The role of an **Actor** (1) entails kissing each other, while wearing an EEG-headset. The electrical brain-activity during kissing is made visible on the screens real-time, depicted by **Data visualization** (2) in the figure above.

Figure 4. Individual screens for kissing data.

Figure 5. Host discussing with Actors.

Figure 6. Actors kissing.

Figure 7. Actors reflecting

The role of **an Observer** (3) is to witness the kissing data, as 'moving tracings' (Nevejan, C. (2012)). They also provide insights on their experience through questionnaires, to further articulate the difference between two possible positions of perceiving data-fication of a kiss: as 1. a Voyeur and 2. a Data scanner.

In addition, each BCI mediated Artistic Social Lab has a **Host** (C). Before and after the acts of kissing, the Host mediates (invites, frames, guides and negotiates) the process of embodied experience, collective reflection and expression. The Host mediates the BCI mediation.

Procedure. The Host invites Actors and Observers as 'co-researchers' in this Artistic Social Lab. They are asked to perform agency in public space, to experiment and reflect, and to share their experiential expertise in dialogue.

a) Host placing headsets and explains,
b) Actors reflecting with closed eyes,
c) Actors kissing,
d) Actors reflecting with closed eyes,
e) Actors discuss the experience with Host
f) Actors relate experience to data, with Host.

Documentation of the procedure is shown to the left in figures 4-7.

ASL Experiment 2: Artistic Social Lab

To study shared experience and reflection, in BCI mediated mirror processes, Experiment 2 introduces the concept of 'dancing data' in two modalities:

Figure 8 (right). Realtime streaming data around the Actors, showing brain activity while kissing.

1. Sonification of the kiss
EEG data of each kiss sonificated real-time: data are translated directly to sound using a pre-defined algorithm.
A sound installation is placed around the Observers, with speakers from four directions.

2. Environmental Visualisation
For each kiss the EEG data sequences of the two Actors are visually imposed on each other, together creating a real-time stream of 'Dancing Data' around the Actors. Spatially, these Dancing Data real-time stream around the Actors. A floor projection stages the kiss, both bridging and isolating Observers and Actors, in communal patterns and flow.

Figure 9, 10 (above). Host discussing with Actors relations between kissing experiences and data visualization.

Figure 11 (right). Experiment 2 with Observers around.

Insights

Observers are more concentrated and immersed in the circular data environment, in comparison to experiment 1. **Actors** express that the soundscape makes the kiss more concentrated and intense.
2. In the discussion with the Host, **Actors**' express their emotional memories of their kisses.
Actors and Observers express shared reflection on the relation between intimate experiences and data, when:

a) Actors, Observers and Host stand in close proximity, and b) they witness kissing Actors produce data. Shared intimate data-interpretation and -appropriation happens on the basis of shared co-creation, intimate memory and imagination, leading to understanding the kissing data as an imaginative, 'secret portrait of their kisses'.

Figure 12. Performance in 'Future Love. Desire and Kinship in Hypernature' exhibition at House for Electronic Arts (HeK) Basel, 2018.
During 2 nights, 35 lover-, friends- and strangers-couples, of all ages, kissed. 1200 Observers were present.

Discussion

In the near future, intimate mirror-processes will be increasingly framed and shaped by interaction through BCI. Çan shared BCI mediated mirror processes be designed, for shared expression of reflection through mirroring?

Both of the shared BCI mediated experiments in this paper show that the interface for kissing is an accessible seducer for participation and expression of reflection. Couples, friends and strangers of various ages and divers cultural backgrounds have participated in these experiments, sometimes for hours.

Experiment 1 shows that unfamiliar and disrupted forms of mirroring occur in the interplay between Actors, Observers and Data. Participants' shared experience and reflection combines perspectives of self-referential experimentation and of mediated, embodied relations.
circular, streaming data and sonification of the joint BCI frame and enhance communal concentration and immersion. Secondly, to appropriate these EEG-data as representation of their intimate experience, Actors and Observers need to be given the opportunity to actively participate in data interpretation and appropriation, through co-creation and imagination.

As a result, participants not only confirm an unfamiliar embodied, intimate synthesis, but they also search for a new vocabulary, to express new forms of embodied relations and a 'tacit sense of knowing' (Gill, S. (2015)) in interaction with the host who, in these experiments creates a dialogue space for reflection and expression.

Current and Future research

Philips Eindhoven & Lancel/Maat

Eindhoven have shown that the 'iconic' meaning of 'the secrecy of brainwaves while kissing' for intimate mirror processes, needs to be reflected in the BCI mediated ASL design to enable emergence of shared experience and reflection. Together with Philips Eindhoven Lancel/Maat are exploring ways to interpret and validate BCI data.
Future research will explore the potential implications of these results for multi-modal shared BCI-mediated experience.

Acknowledgements

References

1. Marina Abramovic, Susanne Dikker, Matthias Oosterik. 2011. Measuring the Magic of Mutual Gaze. Retrieved February 2, 2018, from http://www.artbrain.org/marina-abramovic-measuring-the-magic-of-mutual-gaze.

2. Judith Butler. 1990. Gender Trouble, Feminism and the Subversion of Identity. Routledge Publishers.

3. Judith Butler. April 5-7, 2017. Bodies That Still Matter. In Conference *Resonances of the work of Judith Butler*. Vrije Universiteit Amsterdam.

4. Antonio R. Damasio. 2003. Looking for Spinoza: Joy, Sorrow, and the Feeling Brain. Harvest Publishers USA.

5. Katharina Gsöllpointner, Karla Romana Schuler, Ruth Schnell. 2016. Digital Synesthesia, A Model for the Aesthetics of Digital Art. Edition Angewandte Austria.

6. K. Kwastek, Katja. 'Aesthetics of interaction in digital art', MIT press, 2013

7. Marc Hansen. 2006. Bodies in code. Interfaces with Digital Media. Routledge Publishers.

8. Lancel, K; Maat, H. (Lancel/Maat). 2014. E.E.G. KISS. Retrieved February 2, 2018, from http://www.lancelmaat.nl/work/e.e.g-kiss/

9. Mariko Mori. 2003. Oneness. Retrieved February 2, 2018, from https://pinchukartcentre.org/en/news/22782

10. Caroline Nevejan. 2012. Trust and Truth in a Networked World. Delft University of technology.

11. Anton Nijholt & Chang S. Nam. 2015. Arts and Brain-Computer Interfaces (BCIs). *Brain-Computer Interfaces*, 2:2-3, 57-59, DOI: 10.1080/2326263X.2015.1100514

12. Hub Zwart. 2017. Extimate Technologies and Techno-cultural Discontent: a Lacanian Analysis of Pervasive Gadgets. *Techné: Research in Philosophy and Technology,* 21:1 (2017): 24–54

13. Satinder Gill. 2015. Tacit engagement, beyond Interaction. Springer International Publishing.