UNDERSTANDING AFFECTIVE ENGAGEMENT AS A RESOURCE IN INTERACTION DESIGN

BY JONAS FRITSCH
CENTER FOR DIGITAL URBAN LIVING
DEPARTMENT OF INFORMATION AND MEDIA STUDIES
AARHUS UNIVERSITY
TEL: +45 89429282
imvjf@hum.au.dk

This paper proposes affective engagement as a possible resource when designing interactive environments. The notion of affect and affective experience as developed by Brian Massumi in cultural theory is presented as a theoretical foundation for conceptualizing experience in interaction design. In particular, it is shown how Massumi provides a non-informational understanding of affect as distinct from emotions. Instead, Massumi offers a processual and relational account of affective experience as a part of dynamic events of becoming. Through an analysis of the interactive installation *Touched Echoes,* the concept of affective engagement is introduced to inform the practical work when designing experiential fields as conditions of emergence in interaction design.

INTRODUCTION

In his seminal article *From Computing Machinery to Interaction Design*, Terry Winograd introduces the need for developing interaction design as a discipline concerned with the design of digital artifacts based on an understanding of the relationship between humans and digital technology (1997). Winograd argues that this change is necessary since people are living with the technologies in what he terms "interspaces" (1997, p, 161). This calls for a design practice based on a dynamic understanding of the developments in digital possibilities, human needs, and situated social as well as physical contexts (Thackara 2001). Consequently, interaction design needs to continually revise and develop new theoretical, analytical and practical tools contributing to broaden the understanding of the world and the people the design is aimed for.

Traditionally based on a theoretical foundation from cognitive psychology and the work setting as a starting point for the design practice, interaction design is today experimenting with new theoretical foundations and interaction forms uncovering new contexts of use to be explored and designed for (Dourish 2001, McCarthy & Wright 2004). This shift in design practice is both stemming from and accompanied by a shift in the perception of the people that might live with the digital technology, and the role the technology might play in their lives (Bolter & Gromala 2003). People are not always rational or striving for efficiency in their interaction with the technology; happiness, reflection, provocation and desire are also part of human life and can function as a starting point for designing new, engaging interactive environments in new contexts of use (Dunne 1999, Petersen 2004). This has called for a renewed attention to the experiences interactive

environments have to offer (Forlizzi & Battarbe 2004, McCarthy & Wright 2004). As part of this experience-oriented approach, attention has among other things been given to developing accounts of what has been termed the "aesthetics of interaction", seeking a richer understanding of the possible experiences interaction design has to offer (Petersen 2004).
The concept of *affect* has been greatly influential in broadening the scope of both the theoretical foundations and practical design implications to meet these new challenges (Picard 1997, Norman 2002, Sengers et. al. 2002, Boehner et. al. 2005, Höök 2008). A common goal of these very different approaches seems to be to make sense of how we as human beings experience the world and hence digital artifacts at our hands, to be able to foster more engaging designs. This paper seeks critically to contribute to this work by offering the concept of affective engagement as a resource when designing engaging interactive environments and artifacts. The concept accounts for the complex ways in which we are bodily and cognitively, hence affectively, engaged in the exploration and use of these artifacts and environments. Based on the work of Brian Massumi in cultural theory, affect is presented as radically non-informational and as a qualitatively different experiential dimension than that of emotions. Massumi develops a highly processual notion of affective experience providing a vocabulary for conceptualizing fields of experience in terms of affective tonality, mesoperception, events, conditions of emergence and becoming. Through the analysis of the interactive artwork *Touched Echoes*, the vocabulary shows how the installation through the use of interactive technologies affectively engages the users in an exploration of the interactive setup. This leads to the development of the concept of affective engagement and reflections on how it can be used actively as a resource in interaction design.

ON THE CONEPTUAL DIVERSITY OF AFFECT IN HCI AND INTERACTION DESIGN

There exists a great amount of academic literature concerning the concept of affect in HCI and interaction design. When talking about affect you can truly talk about a conceptual diversity. This sections attempts to present an overview of the field. The trajectory starts by defining how the concept has been introduced into HCI and interaction design (Picard 1997, Norman 2002). Various approaches questioning the informational and cognitivist model of affect arguably offered by these approaches are then presented introducing concepts like the enigmatics of affect (Sengers et. al 2002), affect as interaction (Boehner et. al. 2005) and affective loops (Höök 2008). In the next section we turn to Brian Massumi and cultural theory where we find important conceptual building blocks in developing a model of human affective experience to be used as a foundation for understanding affective engagement.

Affective Computing and Emotional Design
Rosalind Picard has been instrumental in introducing the concept of Affective Computing as a research agenda (1997). Picard argues that emotions and affect are important for understanding rational thought, and can be an important resource in computer science. To Picard, Affective Computing describes computing that relates to, arises from or influences emotions (1997, p. 1). In her work, she specifically stresses the need for developing computers that "have" emotions:

"The challenge is in building computers that not only recognize and express affect, but which have emotions and use it in making decisions, a challenge not merely of balance, but of wisdom and spirit." (Picard 1997, p. 15)

Another prominent influence in the interaction design community has been that of Donald Norman, who has introduced the concept of affect in his book on Emotional Design (2002). Norman argues that beauty is a central concern in design and should be dealt with in the design process. Norman uses affect to broadly cover concepts such as emotion, feelings, mood, motivation and qualia (2002, p. 38). According to Norman, affect and cognition can both be considered information processing systems, but with different functions and operating parameters. He proposes a model of emotion that explains how emotions and behaviors are determined by different levels of the brain: the visceral, the behavioral and the reflective levels (Fig. 1).

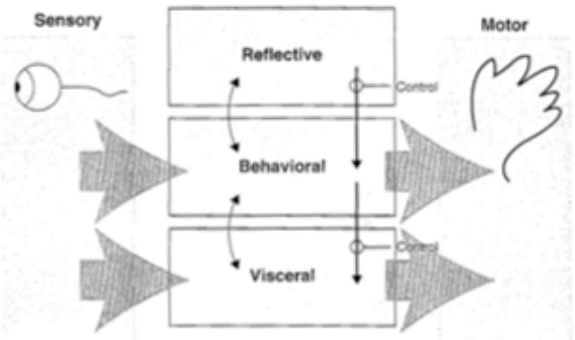

Fig. 1: Norman's model of emotion.

The visceral level responds rapidly, making judgments about what is good or bad. The behavioral level is the site where most human activity occurs. The reflective level is conscious reflection on the routines we perform. Norman broadly states that our affective state, whether positive or negative, changes the way we think.

Critical and Interactional Approaches

Both Picard and Norman have played an important role in introducing the idea of emotion and affect as central for understanding how we as humans make sense of and experience the world and hence interactive technologies. However, in recent years Picard and Norman's notions of affect have been subject to some critique. In Sengers et. al. (2002) it is argued that the traditional work done on Affective Computing is faulty in focusing on the informatics of affect, i.e. the structuring, formalizing, and representing emotion as informational units. Instead, they propose an *"...enigmatics of affect, a critical technical practice that respects the rich and undefinable complexities of human affective experience."* (Sengers et. al. 2002, p. 87). The authors argue that emotion should not solely refer to whether the system is able to apprehend the user's emotion, but also to the emotions the user develops while interacting with the system. The authors argue that *"...the design of systems that support enigmatic affect must include considerations of aesthetics, poetics, and meaning..."* (Sengers et. al, p. 96). Finally, they stress that the emotions are in the interaction and not in the code or hardware.

Boehner et. al. offer a similar critique of Picard's notion of affective computing (2005). The authors argue that Affective Computing, while challenging the primacy of rationality in cognitivist accounts of human activity, is actually reproducing its information-processing model of cognition. They specifically criticize the notion of information as the basic unit of analysis, where affect is seen as information that can be transmitted from people to computational systems and back. Instead, they introduce an alternative model of affect and emotion as interaction; dynamic, culturally mediated and socially constructed and experienced:

"This leads to new goals for the design and evaluation of affective systems - instead of sensing and transmitting emotions, systems should support human users in understanding, interpreting and experiencing emotion in its full complexity and ambiguity." (Boehner et. al., p. 59).

Instead of understanding information as an internal individual, delineable phenomenon, the authors take emotion as a social and cultural product experienced through our interactions. The authors examine an alternative account of emotions as interactional rather than informational objects moving from technologies of representation to technologies of participation. This is ensured by the richness of emotion, which mitigates against reductive representation in the interaction.

In line with Sengers et. al. and Boehner et. al., Höök (2008) defines the concept *affective loop experiences* that draws upon physical, emotional interactions between user and system and involve both body and mind as a basis for designing embodied interactive affective systems. Affective loops are grounded in an interdisciplinary coming together of neurology, psychology and ethnography. Philosophically, phenomenology functions as the foundation for understanding the design of bodily interfaces, providing a vocabulary for talking about both the experiential and cultural body - and consequently primal (biology) and secondary (social) emotions. The author stresses the dynamic and processual nature of emotions which are neither automatic, nor solely learnt:

"The way we make sense of emotions is a combination of the experiential processes in our bodies and how emotions arise and are expressed in specific situations in the world, in interaction with others, colored by cultural practices that we have learnt. Designing for embodied representations of emotional experiences should thus ideally relate to and build upon both the experiential and cultural body." (Höök et. al 2008).

The dynamics of an affective loop start, when users first express their emotions through some physical interaction involving their body, for example through a manipulation of an artifact. The system then responds, generating affective expressions using for example colors, animations, and haptics. This in turn affects users making them respond and, step-by-step, feeling more and more involved with the system. Affective loops describe, how our human, physical, bodies can be an arena for embodied experiences where social and bodily practices are interwoven enriching the understanding of affective loops as a basis for designing emotional experiences. In her understanding, Höök stresses that emotions are seen as processes, constructed in the interaction, starting from bodily, cognitive or social experiences, that the user is an active, meaning-making individual - the interpretation responsibility does not lie within the system – an that an affective loop creates non-dualistic, non-reductionist experiences.

Other approaches include Aboulafia & Bannon (2005) outlining a framework for affective design based on Activity Theory. Ciolfi (2007) presents design work aimed at augmenting people's experience of place within an airport focusing on activity and place including dimensions of affect and emotion. Finally, Muller et. al (2007) state, that in artistic contexts, it is increasingly important to consider the affective qualities together with the ability to convey information efficiently and accurately. The authors use richness and ambiguity as key points to create a sense of integrated physical and mental engagement with the work of art and to create a reflective state in which the participants consider correlations between their thoughts and specific physiological states.

The presented work clearly illustrates, that the concept of affect has many roots in the HCI and interaction design communities. While primarily adhering to the critical and interactional tradition, the next section seeks to introduce the concept of affect as it has been developed by Brian Massumi as part of a philosophy of experience in cultural theory. This contributes to moving away from an informational understanding of affect as something which can be transferred from an object (or a system) to a subject (a user) to a processual, relational and dynamic account of the concept in terms of events and becoming. However, In looking into the notion of affect in Massumian terms also entails a distinction between affect and emotions.

AFFECTIVE EXPERIENCE

Drawing on particularly the French philosopher Gilles Deleuze's reception of Baruch de Spinozas vocabulary, Massumi defines affect in terms of *the ability to affect or be affected*. He stresses that the importance of the ability to affect and the ability to be affected are two facets of the same *event*. Massumi adds another Spinozan definition stating that *"... a power to affect and be affected governs a transition, where a body passes from one state of capacitation to a diminished or augmented state of capacitation*." (McKim in press, p. 1) The transition, Massumi underlines, is *felt*: the distinction between feeling and capacitation/activation come together to form a:

"....separation-connection between feeling and activation (which) situates the account between what we would normally think of as the self on the one hand and the body in the other, in the unrolling of an event that's a becoming of the two together." (McKim in press, p. 1)

The notion of affect overrides the distinction between subject and object; instead, there is an affectation that happens in-between -- in the middle, or in Deleuzian terms, in the dynamic unity of an event (McKim in press, p. 1). The felt quality of a given experience is that which characterizes the feeling of the transition as the body moves from one power of existence to another (which can be separated from the actual event), from which follows that the account of affect will have to *"...directly address forms of experience, forms of life, on a qualitative register."* (McKim in press, p. 1) A body is defined by what capacities it carries from step to step; the charge of affect is not something fixed. Instead of working with pre-determined and static notions of the experiential, Massumi stresses the importance of understanding the *relations* that occur in the middle of a region of experience (McKim in press, p. 2) The focus is to describe and understand a relational event that plays out differently every time, taking up the past differently, creating new potentials for the future.

Emotion, Non-sensuous Perception and Sensation

Affect differs from emotion in terms of the quality of experience attached to it. Emotions can, in Massumian words, be seen as a very partial expression of affect; a qualified, personal experience:

"An emotion or feeling is a recognized affect, an identified intensity as re-injected into stimulus-response paths, into action-reaction circuits of infolding and

externalization – in short, into subject-object relations." (Massumi 2002, p. 61)

As opposed to this, affect works at the level of virtuality and potentiality again echoing the work of Deleuze and french philosopher Gilbert Simondon. Affect is pre-personal, pre-individual and nonconscious but real in so far as it offers potential for action: *"Affect as a whole then, is the virtual co-presence of potentials."* (Zournazi 2003) The virtual is defined as that "*...which is maximally abstract yet real, whose reality is that of potential – pure relationality, the interval of change, the in-itself of transformation*." (Massumi 2002, p. 58) Affect then, as the pure event, and as part of every pure event is itself a two-sided coin:

"What is being termed affect in this essay is precisely this two-sidedness, the simultaneous participation of the virtual in the actual and the actual in the virtual, as one rises from the other. Affect is this two-sidedness as seen from the side of the actual thing*, as couched in its perceptions and cognitions. Affect is the virtual as point of view, provided the visual metaphor is used guardedly. For affect is synesthetic, implying a participation of the senses in each other; the measure of the living thing's potential interactions is its ability to transform the effects of one sensory mode into those of another."* (Massumi 2002, p. 35)

Using mathematician and philosopher Alfred N. H. Whitehead's term of *non-sensuous perception*, Massumi describes the workings of affect as the virtual perceptions of any given situation which whatever its lived *affective tonality* is sundered by non-sensuously lived micro-intervals filled only qualitatively and abstractly by affect (Massumi 2007, p. 82). The non-sensuous perception connects with sensation in what Massumi terms the dimension of mesoperception as presented in *Parables for the Virtual – Movement, Affect, Sensation*. Mesoperception describes our synesthetic sensibility, where input from all five senses meet to form sensation which is both translated into and influenced by movement and affect.
Mesoperception is made up of *proprioception* and *viscerality.* Proprioception is defined as the sensibility proper to the muscles and ligaments (how we know where we our body is in space), as opposed to tactile sensibility (which is "exteroceptive") and visceral sensibility (which is "interoceptive"). Viscerality or interoception in return, immediately registers excitations gathered by the "exteroceptive" senses before they are fully processed by the brain. Viscerality operates on a level where the body is unable to react or reflect, before it is jolted back into action-reaction by recognition, the space of passion operating on degrees of intensity bringing the sensational back to affect (Massumi 2002, p. 61) These degrees of intensity, this ability to be affected and to affect, can be said to depend on the affective tonality of a given situation. Rather than determining our actions in a given context, the affective tonality is tied to *tendencies* that will always play out differently in every event.

Affective Experience in Interaction Design
Massumi underlines that starting from affect does not mean starting from scratch; there is no such thing since even one body alone is pre-populated: *"...by instincts, by inclinations, by teeming feelings and masses of memories, conscious and nonconscious"*. (McKim in press, p. 3) According to Massumi, the question always is *how* this crowding is moved into a new constitution, i.e. the constitution of becoming. This question is ultimately a question of the emergence of a subject:

"The subject of an experience emerges from a field of conditions which are not that subject yet, where it is just coming into self." (McKim in press, p. 3)

When more directly talking about what causes changes in the affective tonality and hence our affective experience of a given situation, Massumi uses Charles Sanders Peirce's concept of *shock*, which precedes every event (McKim in press, p. 4). According to Massumi, affect is inseparable from the concept of shock understood as *"...a change in focus (...) an interruption, a momentary cut in the mode of onward deployment of life."* (McKim in press, p. 3) An onset of experience, which by nature is imperceptible; a micro-perception, felt without registered consciously, leading to a re-cueing of our bodily powers of existence. According to Massumi, the world we live in is made up of these reinaugural microperceptions, cutting in, cuing emergence, priming capacities. Not every tendency and capacity activated bears fruit in the meaning of becoming actualized, but everything leaves its trace:

"Because the body, in this eventful rebeginning, carries tendencies reviving the past and already striving toward a future. In its commotion are capacities reactivating, being primed to play out, in a heightening or

diminishing of their collective power of existence. The body figures here as a cut in the continuity of relation, filled with potential for re-relating, with a difference. Microperceptual shock is like a re-cueing of our bodily powers of existence." (McKim in press, p. 4)

A Massumian approach to describing the experiential fields offered by interactive environments needs to take into consideration the affective tonality of these environments, in terms of how they might activate and capacitate (in other words: affect) bodies as they move into and through various interactive situations. The focus is on describing the relational complexity of the events forming and being formed by the affective experience. Looking at priming and cuing of the environment from an affective point of view further necessitates looking into potential situations of emergence and re-conditionings of the emerged in relation to becoming:

*"Conditions of emergence are one with becoming. Re-conditionings of the emerged define normative or regulatory operations that set the parameters of history (the possible interactions of determinate individuals and groups)."(*Massumi 2002, p. 10)

Massumi stresses, that to get anywhere with the concept of affect, it is necessary to retain the manyness of its forms. Affect cannot be reduced to a thing, because it is not a thing; it is an event, or a dimension of every event. Massumi further underlines that if this variety is respected, the concept of affect offers a "…field of questioning, a problematic field *where the customary divisions that questions about subjectivity, becoming or the political are usually couched in do not apply*." (McKim in press, p. 1, my emphasis)

In the following section, through the analysis of the interactive installation *Touched Echoes*, I will try to show how this field of questioning unfolds using the presented vocabulary to describe the affective experience offered by the installation. The analysis will show how the concept of affective experience provides a rich way to conceptualize the experiential field offered by this particular interactive environment. Based on the analysis, the section concludes by proposing the concept of affective engagement as a useful resource in interaction design.

AFFECTIVE ENGAGEMENT

Touched Echo[1] by Markus Kison is an interactive intervention in public space. The visitors of the Brühl's Terrace in Dresden, Germany are taken back in time to the night of the air raid on the 13th February 1945. That was the night, when Dresden's Old Town was almost entirely destroyed by the allies' air raid. The users of the installation perform and put themselves into the place of the people who shut their ears away from the noise of the explosions.

While leaning on the balustrade the sound of airplanes and explosions is transmitted from the swinging balustrade through their arm directly into the inner ear via bone conduction (Fig. 4). Bone conduction was developed for hearing devices and the sound is not transmitted in air and through the middle ear but instead through the skull bone. To send the sound over the arm and hand to the skull bone the railing of the Brühl's Terrace is equipped with several custom made sound conductors and set into a vibration (Fig. 3).

Fig. 2: Pictogram from *Touched Echoes*

The users of the installation are directed to adapt physically as well as mentally to a contemplative position, providing a unique affective experience of both the physical setting and the socio-cultural, and in this case historical, context. Having to physically adapt to the installation, in this case bringing yourself in a position similar to those people trying to avoid listening to the bombers, affects the user directly spurring engagement, or maybe even discomfort. The users suddenly get an idea of what it must have felt like that night in 1945; they travel back in time to this situation and themselves become a kind of "memorial" of it; it lives on, it is retro-activated thought their interaction with the installation.

[1] http://www.markuskison.de/touched_echo/

Fig. 3: The technological setup

Touched Echoes works mesoperceptively, engaging the full register of perceptive capabilities as described in the section on affective experience. Further, the narrative dimension surrounding the physical installation makes room for a complex, long-lasting reflection both on the experience in itself and its historical importance. Your body becomes a site and conductor for exploring the content of the installation; by investing yourself, you get access to the stories hidden behind the technological setup. The physical setup also allows for people to come together to experience the installation. Symbolically, though, you can only experience the horror of the bombing by yourself, perceptually isolated from others.

Fig. 4: People engaged in the interaction

Touched Echoes can be seen as a designed, interactive environment and the experiential field it offers can be understood in affective terms The interactive installation offers conditions of emergence for *affectively engaging* the users in the interaction. Affective engagement in this respect refers to how the experiential field offered by the physical and digital setup fosters engagement by providing a context of micro-perceptual shock when it comes to the immediate interaction with the setup. Crouching down and using the body as a transducer of digital information, forces an active engagement on the user if she wants access to the content at hand. In the interaction with the installation, the user's body immediately registers the movements and transductions mesoperceptively.

The initial affective engagement also facilitates (but does not dictate) a possible long-term relation with the installation at more qualified levels of experience e.g. in terms of emotional attachment or cognitive reflection.Importantly, though, the experience is felt before it registers consciously. The event of the bombings of 1945 is retro-activated by each single user. In turn, each user's memory of the bombings is also retro-activated through the engagement with the installation.

Touched Echoes actively and affectively engages the users in the exploration of the physical and digital setup experimenting with the affective tonality of the cityscape, the story behind the setup, the interactive situation and the possible relational events that might emerge from the initial interaction. The conditions of emergence offered by the interactive design activates the user possibly creating new capacitations and relations – to Dresden, to the history of the bombings, to the user herself, to the technology used in the setup. Affective engagement thus describes the immediate experiential field as conditions of emergence giving rise to an event, that takes on a life of its own through and after the interaction. In the following, the concept will be reflected upon as a possible resource in interaction design.

AFFECTIVE ENGAGEMENT AS A RESOURCE IN INTERACTION DESIGN

From the theoretical development and practical analysis I will argue that the notion of affective engagement can function as a valuable resource in interaction design. A basic premise for the development of the concept is that digital technologies are an integrated part of our embodied, experiential practice in the world and that we experience them affectively as part of situated physical settings and socio-cultural contexts. The theoretical foundation of affective experience provides a vocabulary to talk about our affective engagement with the world and hence interactive technologies. *Touched*

Echoes functions as an example of how digital technologies can be used in the design of experiential fields, that actively provide conditions of emergence and contexts for rich affective experiences. Affective engagement is especially valuable as a resource when the goal of the design process transcends ideals of effective, task-oriented design. As shown in the analytic example, there is much to explore through dynamically challenging and changing the basic interactional arrangements fostering new relational events altering our conception of the digital, the physical and the social. Although it can be argued that *Touched Echoes* is more an artwork than design in the traditional sense, the analysis highlights key aspects considering the experiential field offered by the installation in relation to the interaction, that are of fundamental interest to any design process dealing with interactive objects and environments. Designing for affective engagement would take this as a starting point and focus on the process and evolution in the design based on the understanding that you cannot fully orchestrate the affective experience.

In relation to the experience-oriented domain and aesthetics of interaction as presented in the beginning of the paper, the idea of affective engagement and affective tonality provide an understanding of how we orient ourselves in the world from a range of complex experiential dimensions. The concept also opens ways for experimeting with how our experience of the world is conditioned by nonconscious levels of experience such as passion, proprioception and viscerality.

To the existing body of work done on affect in HCI and interaction design, affect as it is developed in this paper adds to a non-informational understanding of the concept. Affect is not something that can be transferred from an object to a subject; it is an event and part of every event, and it plays out differently in specific situations. As part of a pre-individual, nonconscious dimension of experience, affect is also qualitatively different from emotion, which can be seen as a partial expression of affect in the form of a qualified personal experience. It is fundamental to keep this distinction in mind when designing for affective engagement; not as a mutual exclusion but as different forms of experience on a qualitative register.

Although the work presented is primarily of a theoretical and analytical nature, I do believe that there is a great potential in introducing the concept of affective experience and the idea of designing for affective engagement into a practical design process.

Future work will further develop this initial investigation hopefully providing further insights on a practical and theoretical note. It is important to underline, that neither affective experience nor affective engagement should be used blueprints for design. Echoing Massumi, I will argue that the concept of affective engagement offers a "*field of questioning, a problematic field*" for interaction design by pointing to an exploration of the full complexity and dynamics of human experience.

ACKNOWLEDGMENTS

A warm thank you to Brian Massumi, Kim Halskov and Bodil Marie Stavning Thomsen for valuable and inspirational feedback on earlier drafts of this paper and critical discussions along the way. This research has been funded by the Danish Council for Strategic Research grant number 2128-07-0011 (Digital Urban Living).

REFERENCES

Aboulafia, A. and Bannon, L. J. 2005, 'Understanding Affect in Design: an Outline Conceptual Framework' *Theoretical Issues in Ergonomics Science* 5:1, 4-15

Boehner, K., DePaula, R., Dourish, P. and Sengers, P. 2005, 'Affect: From Information to Interaction, Critical Computing', *Proceedings of the 4th decennial conference on Critical computing*

Bolter, J.D. & Gromala, D. 2003, 'Windows and Mirrors: Interaction Design, Digital Art and the Myth of Transparency', *MIT Press*

Ciolfi, L. 2007, 'Supporting Affective Experiences of Place through Interaction Design' *Journal of CoDesign*, 3:1, 183-198

Dourish, P. 2001, 'Where the Action Is: The Foundations of Embodied Interaction', *MIT Press*

Dunne, A. 1999, 'Hertzian Tales - Electronic Products Aesthetic Experience and Critical Design', *RCA Research Publications*

Forlizzi, J., Battarbee, K. 2004, 'Understanding Experience in Interactive Systems', *Proceedings of the 2004 conference on Designing Interactive Systems: processes, practices, methods, and techniques*

Pp. 261-268

Höök, K. 2008, 'Affective Loop Experiences - what are they?'
Proceedings of PERSUASIVE 2008
Pp. 1-12.

Höök, K., Ståhl, A., Sundström, P., Laaksolahti, J. 2008, 'Interactional Empowerment'
CHI 2008 Proceedings, Dignity in Design,
Pp. 647-656

Massumi, B. 2002, 'Parables for the Virtual: Movement, Affect, Sensation'
Duke University Press

Massumi, B. 2007, 'The Thinking-Feeling of What Happens' In Massumi, B., Mertins D., Spuybroek, L., Marres, M. & Hubler, C. 2007, 'Interact or Die: there is Drama in the Networks' (pp, 70-91).
NAI Publishers.

McCarthy, J. C. and Wright, P. C. 2004, Technology as Experience',
MIT Press

McKim, J. in press, Of Microperception and Micropolitics – Brian Massumi interviewed by Joel McKim,
Forthcoming, Inflexions, no. 3

Muller, L., Turner, G., Khut, G., Edmonds, E. 2006, 'Creating Affective Visualisations for a Physiologically Interactive Artwork'
Proceedings of the Information Visualization (IV'06)

Norman, D. 2002, 'Emotion & Design. Attractive Things work better'
In Interactions Magazine, IX (4),
Pp. 36-42

Petersen, M. G. 2004, 'Remarkable Computing – the Challenge of Designing for the Home'
Late Breaking Results Paper, CHI 2004

Petersen, Marianne G., Iversen, Ole S., Krogh, Peter G., Ludvigsen, Martin 2004, 'Aesthetic Interaction — A Pragmatist's Aesthetics of Interactive Systems'
Proceedings of the 2004 conference on Designing Interactive Systems: processes, practices, methods, and techniques.
Pp. 269-276

Picard, R. W. 1997, 'Affective Computing'
MIT Press

Sengers, P., Liesendahl, R., Magar, W., Seibert, C., Müller, B., Joachims, T., Geng, W., Mårtensson, P. and Höök, K. 2002, 'The Enigmatics of Affect'
Proceeding of DIS2002, *London,*
Pp.87-98

Sharp, H., Rogers, Y and Preece, J. 2007 'Interaction Design: Beyond Human-computer Interaction,
John Wiley & Sons; 2nd Edition

Thackara, J. 2001, 'The Design Challenge of Pervasive Computing'
Interactions, May-June 2001,
Pp. 46-52.
Winograd, T. 1997, 'From Computing Machinery to Interaction Design' In Denning, P. & Metcalfe, R. (eds.) 'Beyond Calculation: The Next Fifty Years of Computing'
Springer-Verlag.
Pp. 149-162

Zournazi, M. 2003, 'Navigating Movements: an Interview with Brian Massumi'
21C Magazine
Retrieved June 1st 2009 from http://www.21cmagazine.com/issue2/massumi.html.