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# Temporary Altered Perception of Birth Space Ambiances

## Case of Women in Labor

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*Abstract.* The “birth event” is considered as an altered ambiental situation since it affects woman sensibility and causes a temporary alteration of her birth space perception. The study focuses on a spatial characterization of ambiances and analysis of stress level of woman in labor in the Maternity and Neonatology Center of Tunis-Tunisia, captured through ElectroDermal Activity (EDA). This study highlights correlation between stressful ambiental situations, architectural aspects of the birth space and altered perception of women in labor. Capturing emotions and analyzing their impact on perceiving spaces is susceptible to renew the way of understanding ambiances.

*Keywords.* Altered Perception, Birth Space, Woman in Labor, Ambiental Situations

### Introduction

Considering architectural space as a sensitive environment leads us to think about ‘ambiance’, as a key notion to explore deeply a built space. Ambiances contribute to enclose space and its practices. It implies an in-depth reflection on physical, sensitive and social dimensions of architecture. Ambiances depend on space; its features and the user profile.

### *Ambiantal Situation-Perception*

The study of ambiance cannot therefore be isolated; it remains an extraction from a social-cultural and spatial-temporal context. It is always situated. Ambiance refers to a defined situation. It is an immediate sensitive experience of a subject through his body in a concrete space and in a defined time. It is based on the situated perception of surrounding environment. It can be defined as the quality of a situation (Thibaud, 2011).

In fact, an ambiental situation is not limited to environment; it is a continuity of a being through his background, practice and emotion. In short it is always depending on the actor of this ambiental scene, how he is, how he perceives and how he acts. “In everyday life, when I perceive, I am always somewhere, exposed to my surroundings and in the process of doing something” (Thibaud, 2002). It’s worth noting here that the space perception is both a physical and sensorial experience. In the visible side, it is drawn as an affective process involving different senses, in the invisible one, as a brain and mental interpretation process. To sum up the balance between the

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surrounding environment and the subject, we must consider his well-being, but it is contextual and depends on every situation (joy, fear, stress...) which transforms his perception of the environment into a modified or 'altered perception'. We qualify it as a distortion of the perception of reality. Among altered ambiental situations, the "birth event" is considered as a complex and ambiguous one since it affects woman sensibility. Then, this study aims to identify stressful situations created following an incompatibility between the physical and sensory capacities of the woman in labor and the physical and sensitive qualities of the space.

### *Birth Event*

Indeed, "birth event" is very significant in a woman life, since it creates an intensive universe of emotions. It marks a physical and social transition (Van Gennep, 2004). A study of the event via ritual theory turns out to be interesting. Ritual theory offers significant insight of the power of this event.

In the case of a rite of passage, the woman in labor goes through three stages: separation, transition and reintegration (Van Gennep, 2004). The first stage corresponds to the "separation" of the ritual subject from society. Birth is an exceptional event that obliges woman in labor to temporarily withdraw socially and spatially from its environment. They leave her daily space to join "other spaces", breaking with traditional time (Foucault, 1986). Here, the hospital, as a birth space, can be described as a space of passage.

At the moment of active labor and of "birth time", woman in labor passes through the stage of "transition". She lives a physical and emotional experience that lead to sensations of pain, power, and stress... that brings up deep feelings of disconnection or isolation. This stage has a potential for change, or transformation and initiation to another level of consciousness (Reed et al., 2016). In this transition period, she is in deeply altered states. At the finally stage "aggregation", or "reintegration" the woman reintegrate society with a new role or state: of mother.

Birth event makes woman live a state of ambiguity. Woman in labor reaches a state of consciousness (Kelpin, 1984) can be qualified as "altered". These states in labor moment represent a time when woman attention is focused on a specific point limiting awareness of other elements present in the environment. Some scientific studies showed that "endorphin hormone" secreted by woman body as response to pain in labor moment participates to change her sensation of the environment. "Endorphin has properties that are similar to drugs of the opiate family" (INSPQ, 2014).

This modification of consciousness state will impact the perception of space and time. Woman creates her "bubble" where her consciousness is modified. The alteration of normal sensory boundaries can change perceptions, including time perception, so that a feeling of fullness can occur (Parratt, 2002).

### **Methodology**

Our empirical study involves quantitative and qualitative methods. For a better understanding of this particular situation, various registers of analyses are adopted in this study as stress signals, spatial qualities, perceptual activity and user behavior.

In order to get closer to the 'reality' of the field, the methodology adopted in this study includes campaigns of ethnographic observations during birth event detailing the attitudes of woman in labor to underline, her perception of the space and its

ambiances. During these observations, a multidisciplinary experimental protocol is applied. It focuses on spatial characterization of ambiances and analysis of stress level of woman in labor in the Maternity and Neonatology Center of Tunis-Tunisia. The latter will be accomplished using ElectroDermal Activity (EDA) tracking that evaluates the arousal via skin conductance measurements and density measures of emotional states levels. Adding to that, there will be recourse to surveys to better simulate and analyze the sensitive experience of woman in labor.

To realize this experimental protocol, a wearable biosensor device called E4 was used. Its role is to measure emotional states (stress, excitement, happiness...). Its data can be visualized by a software “E4 manager”. Our target population was about twelve women in labor aged between 25 and 32 years. The E4 sensor was worn by each woman in the delivery room and the measures stopped when she is transferred to maternity room.

## Results

Woman in labor faces a break of her sensitive boundaries during birth event and live a variation of stress levels. Along this work, three situations from “birth event path” are chosen to clearly show how and why a change in perception is witnessed during birth time. Each situation represents a unique emotional situation of the woman and expresses her relation with its environment.

A woman of 30 years old which has had a vaginal delivery without epidural is chosen as a representative study case to show it. The figure 1 below represents the curve of her Electrodermal Activity (EDA) for a recording period of 5 hours done in two different spaces: delivery and maternity rooms.

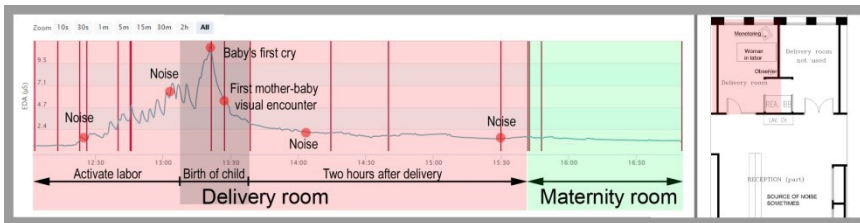


Figure 1. Woman in labor's EDA curve, Ichraf Aroua, 2018

For this study, the analysis concerns only the EDA of woman in delivery room during the child birth. This curve contains specific peaks which represent signals marks corresponding to moments of specific emotion, fear, anxiety or stress. Some are related to physical parameters of space (sound, light, temperature...). In this paper, the stress or emotional peaks analyzed are due to sounds of clinical staff, monitoring machines and baby cry. It's related to some specific sound sources that characterize hospital ambiances. Authors are aware of the importance of all sensory parameters in human perception but we choose to focus on the audio one for a preliminary analysis of EDA signal.

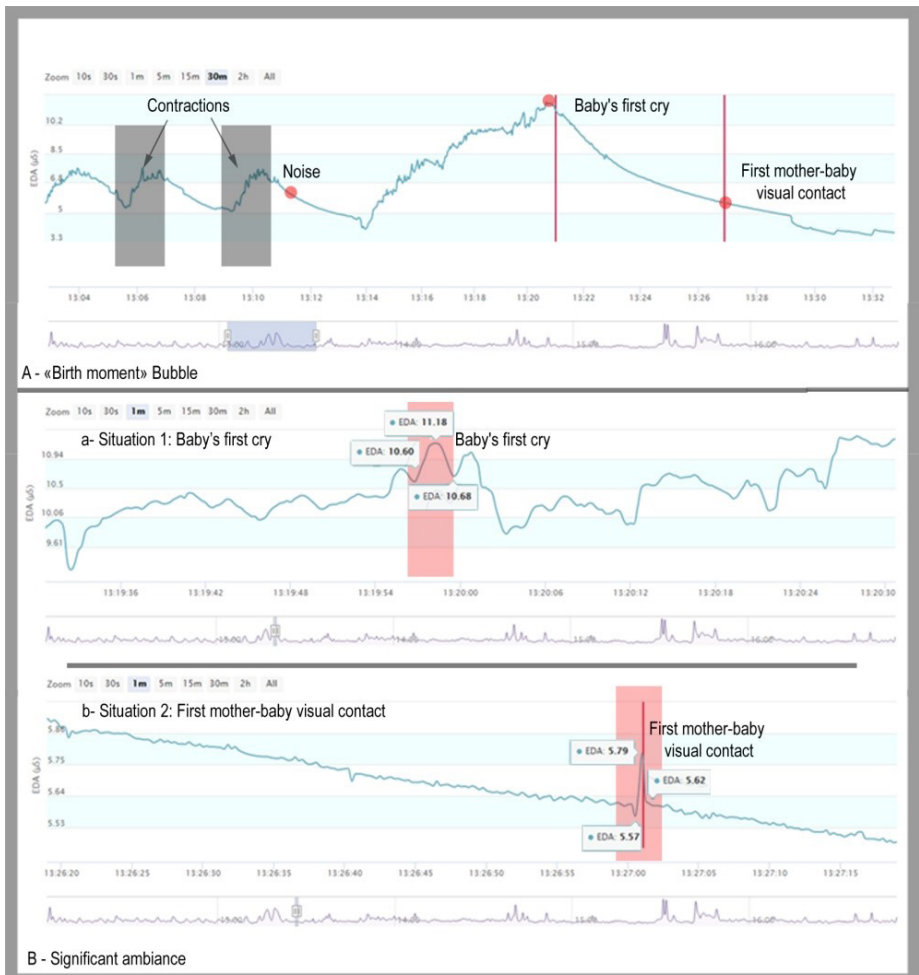
### *Situation 1: Noisy ambience*

In this situation, two stress peaks are identified in different times. The first peak was at the beginning of the experience “activate labor time” while the second was at the end of “two hours after birth”, before her transfer to maternity room. Simultaneously to these peaks, woman in labor was complaining about noise. This was confirmed by woman comments in the activate labor “But what a noise! In addition to monitoring noise their bavaredes bothers me...”. The sound level in this moment is 82 dB(A) but

according to WHO the recommended threshold is not to exceed 45 dB(A). It informs us about the quality of the space. The delivery room is located just in the entrance of the reception which is a crowded space full of sounds (conversation, movement of medical staff, equipment ...) and equipped with a monitoring whose sound is high so that midwife supervises the woman from a far.

For the second peak, the woman complained about the noise coming from the reception; she said: “they picked up their noises, it causes me headaches”. The sound level in this moment is about 64 dB(A). The monitoring is closed after the birth. In both moments the door was open.

### Situation 2: Woman in Labor “Birth Moment” Bubble



**Figure 2.** Birth moment bubble and significant ambiance, Ichraf Aroua, 2018

Preliminary observations of the EDA curve show that the amplitudes of the EDA, in the moment of birth, increase to a maximum of about 10  $\mu$ S (Figure 2-A) and even more in other cases. The maximum response can be increased up to around 8  $\mu$ S in the presence of intensive stimuli (SAAL, 2015) which is rare. This clearly distinguishes the power of the birth event for women in labor.

During childbirth, there are two crowded moments while the correspondent curves have monotonous shapes and show almost no stress peaks. The two moments representing a high level sound are:

- The first one 79 dB(A) just few minutes before the birth.
- The second 64 dB(A) in the beginning of the two hours after birth.

In the first time, there is noise of monitoring and one of the medical staff shouts at the reception and in the second time, there is noise of conversation. The ambulance was crowded while woman didn't reclaim about noise when asking her. Next day of her birth experience, when making survey with her she said: "I don't remember how is the ambulance in the moment of birth; I don't care about all the things that are going on around me. It's just a relief to know at least someone is behind to control and help. I was unable to speak, to see even to hear, I was in 'another world'. Everything is just not important any more than my sensation of pain."

What is important to notice is that the pain factor absorbs the woman and upsets her awareness of those around her and therefore her perception. Several women described this as being in her bubble, in the moment. They feel separated from others and space surrounding. They reach another level of space-time. They remain speechless in front of such situation "birth experience". Midwives described women in labor as disconnected from space and medical staff going right into their own depth of resources.

### *Situation 3: Significant Ambiance*

This two EDA curved (Fig 2-B) show how some moments are very significant and can emotionally affect woman since they are charged with emotions, symbolism and unforgettable memories. These two peaks present emotional peaks; the first baby cry and the first visual contact with her baby. Really it is her discovery so dreamed of her half of the body and the heart long awaited in front of her. When asking a woman she said "in this moment I just remember the first cry and the face of my baby, the rest is flow blurry."

## **Conclusion**

This study highlights the results of a characterization of emotional states of woman in labor linked to "birth event" and all stress and joy linked to such event. This approach revealed that the woman is in a state where her perception of the ambulance is modified or even altered. The approach revealed that various ambiantal situations induced different levels of stress. This is due to the importance of the event from a side, and of the physical ambiances like sound from another side. In several other cases, the peaks of stressful events detected are due to other physical ambiances as light, temperature and some typical sanitized odors of hospitals.

From an ambiantal point of view, we suppose that a well-designed birth space has enough visual and sonic complexity, invokes different levels of stress and arousal and may correct an altered perception. The results of this research are extremely useful to rationalize the choices in design of space birth and considering at the same time the well-being of future mums.

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