BreathSenses: Towards Understanding Breathing Games

Abstract
In recent years attention has increased around digital breathing games via new technology that allows interaction between breathing and video games. While some breathing games use breath as a fun form of interaction, other games use breath to improve mental health aspects a player in order to reduce stress and anxiety. So far, little research has been devoted towards understanding the design of breathing games. To develop an understanding towards the design of breathing games, we begin by proposing a taxonomy depending on the factors of game genre, game design analysis based on the human body senses involved, breathing technique used, aim of the breathing technique, technology used to experience the game world and technology used to measure breathing. To demonstrate the strength of our taxonomy, we analyze example games and discuss how the novel taxonomy could help game designers to create breathing games.

Author Keywords
Taxonomy; Digital games; breathing; respiration; human body senses.

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous;

Note
The full text has been submitted to the late-breaking work. This is a shorter version of the same pointing out to the relevant aims of the workshop. The full text will be provided on request.
**Introduction**

Breathing is something that we do all the time and yet we are mostly not aware of it. Bringing our focus intentionally onto our breath we can learn to observe it without reacting to it, simply watching each breath as it happens [3]. Further, various breathing techniques and exercises are considered fundamental for the development of both physical and mental well-being [1, 6, 8]. Digital games offer promising opportunities for both the practice and research of breathing because the interactive nature of games allows for the development of experiential knowledge. This is important for breathing, as it will help players understand their breathing patterns and allow them to alter it if necessary [9].

**Related Work**

In a study conducted by Krestina and Andrew, “The Journey to Wild Divine” was investigated as a biofeedback management tool to teach breathing skills to children with Attention-Deficit/Hyperactivity Disorder (AD/HD). The children played the game by manipulating their heart rate using breathing techniques taught in the game [2]. Spatial poem by Choi et al., offers a new type of visual interaction expressing the player’s own creative narrative as a real-time visual by playing a musical instrument, which is an emotional human behavior. When a player blows the instrument, to make sounds, the blow changes into energy that makes the player walk continuously in a virtual space [4]. Marshall et al., explored the potential of breathing as an effective and engaging way to enable the control of individual seats on physical amusement rides. Tactics for designing rides in the future that could possibly incorporate breath control were proposed in their research [7]. Moraveji et al., state that feedback would help change the simplest behavior that matters and in our context, it is breathing [9]. His words about feedback point towards gaming as a potential way to change behavior [5]. This work inspired us to build the taxonomy towards understanding the design of breathing games. We call this the breathsenses taxonomy.

**Future Opportunity**

While the breathsenses taxonomy informs game designers about how the discussed breathing games have been designed, it also helps them by showing the gaps that have been highlighted in orange color, indicating unexplored territory. Game designers who intend to design breathing games, can use the unexplored territory and design breathing games by involving more combinations of human body senses during gameplay. Game designers also have the opportunity to explore combinations of breathing techniques and technologies as shown in the breathsenses taxonomy. This might be possible by considering different combinations of human body senses that they want to involve during the gameplay.

**Conclusion**

Although this might not be the only way, breathsenses taxonomy is one of the ways towards understanding the design of breathing games. We believe that it can act as a stepping-stone for game designers who intend to design breathing games. Our next step, post this work is to design and develop our own breathing games and receive feedback from relevant audiences. With our work, we hope that game designers start designing breathing games to help people breathe better.
<table>
<thead>
<tr>
<th>Game Genre</th>
<th>Example Game</th>
<th>Breathing Technique Used</th>
<th>Aim of the Breathing Technique</th>
<th>Game Design Analysis using MDA Framework Based on Human Body Senses Involved During the Gameplay</th>
<th>Technology Used To Experience The Game World</th>
<th>Measure Breathing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open World</td>
<td>Deep</td>
<td>Diaphragmatic Breathing</td>
<td>Reduce stress, be Calm &amp; Playful</td>
<td>Movement of the belly detects the breathing</td>
<td>A Circle on the screen indicates the player's breathing</td>
<td>The ambient sound of an underwater world keeps the player immersed</td>
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<td></td>
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<td>Breath rate is fed back into the game</td>
<td>The circle expands and contracts while the player breathes</td>
<td>The movement in the water is supported by the sound</td>
</tr>
<tr>
<td>Audio</td>
<td>Deep Sea</td>
<td>None</td>
<td>Be A Playful Experience</td>
<td>The sense of sight is obscured by the mask worn by players</td>
<td>A Circle on the screen is used to indicate the player's breathing</td>
<td>The players hold their breath to hear alien sounds</td>
</tr>
<tr>
<td>Casual</td>
<td>Fiery</td>
<td>Breath Breathing</td>
<td>Reduce anxiety while being playful</td>
<td>Players swipe and collect coins while breathing</td>
<td>Players replicate the breathing by looking at the screen</td>
<td>The atmosphere is enhanced by the sound of alien breathing creating an illusion of</td>
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<td>Players replicate the characters breathing movement</td>
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<tr>
<td>Casual, Racing, Music</td>
<td>Breathing Games by Breathing Bank</td>
<td>Pursed Lip Breathing</td>
<td>Reduce breathing and stress related problems while being playful</td>
<td>Players breathing is sensed by the device and taken as input</td>
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<td>Dynamics range from speeding, to intensity of the wind instrument and more</td>
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</tbody>
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**Table 1**: The BreathSenses Taxonomy: Towards Understanding Breathing Games.
References


