



# INFLUENCE OF VIRTUAL REALITY ON THE FEELING OF HUNGER AND THE CONSEQUENCES FOR THE FEELING OF SATIETY AND FOOD CRAVINGS

Riemann, Janine<sup>a</sup>

<sup>a</sup>*Ansbach University of Applied Sciences, Germany*

---

**ABSTRACT:** The influence of virtual reality on the feeling of hunger was investigated. The test with a total of 61 participants showed that virtual reality via the eyes and hand movements can partially influence the feeling of well-being and satiety as well as strongly influence the desire to eat. A statement about the influence on the feeling of hunger cannot be made, because the answers from different questions give contradictory results. Further more detailed investigations are necessary to be able to make a clear statement about the influence on the feeling of hunger.

**Keywords:** Virtual reality; Influence; Hunger; Satiety; Cravings

---

## 1. INTRODUCTION

While newborns eat only to satisfy basic needs listening solely to their body sensation, most adults have exchanged this sensation for cultural eating habits. Also cultural eating habits have probably made every adult eat at least once even though they were not hungry at all. A familiar example scenario of this is the dinner invitation among acquaintances. Because social etiquette demands it everyone eats even if it does not taste good or they are not hungry. Among other things, because of these socially imposed constraints people forget to pay attention to their body-controlled hunger sensations as early as childhood (Gniech). In addition to societal eating triggers advertising also drives many people to eat on a regular basis. Especially in this day and age everyone is constantly surrounded by food advertisements that unconsciously evoke food cravings and make one believe that they have to eat something very specific and cannot do without this taste experience

**How to cite:** Riemann, Janine. 2022. Influence of virtual reality on the feeling of hunger and the consequences for the feeling of satiety and food cravings. In Proc.: 4th International Conference Business Meets Technology. Ansbach, 7<sup>th</sup> – 9<sup>th</sup> July 2022.

(FRANK, 2010). This not only remotely controls the pleasure center but causes many common diseases such as diabetes as a result of obesity. First studies show that therapies for weight loss can be supported by virtual reality (Coons, 2011). However, is it also possible to satisfy elicited cravings and the hunger often initiated only by the brain with Virtual Reality or even to cause a feeling of satiety without the body absorbing the calories? To find out the following research question is investigated. In which direction can the feeling of hunger before taking the lunch break meal (in the cafeteria) be influenced by virtual reality for students and employees of Ansbach University of Applied Sciences?

## 2. METHOD

To investigate this, a group of three students created an experimental setup in virtual reality. First, the setup of the food scene was determined. It was decided to arrange the food selection buffet-like on three extra tables in a semicircle in front of the test place. A clear overview of the food without influencing factors was considered important and the most practical usability. The next step was to determine the food selection. Since there should be a mixed selection of healthy and unhealthy dishes. Attention was also paid to the selection process to ensure that the food was photogrammetry suitable. For the test environment the 3D laboratory and the cafeteria of the University of Applied Sciences Ansbach were available. Due to the proximity to the students and employees, the proximity to the food and thus the supposedly easier recording of the eaten food after the test run, as well as the somewhat quieter environment, the back room of the cafeteria of the University was chosen as test location. For the test time the dining hall's food service served as a guide. After the initial planning was completed, the Unity project was set up and the photogrammetry of the food was started. For the photogrammetry process it was important to freeze the food beforehand, otherwise it would have melted. A photobox, two light boxes and a Sony a6300 camera with a 30mm fixed focal length (APSC) with a fixed aperture of f.14 were used for photogramming. After the photos were converted into a 3D object via Agisoft Metashape, they were then post-processed and optimized in 3DsMax. The tables and chairs were modeled with as little polygon as possible in Maxon Cinema 4D and then imported into Unity as an .fbx file. Version 2021.3.3f1 was used for the Unity project along with the Pro-Builder and Meshbaker plugins. For the test subjects to interact with the scene, various scripts were programmed that cause the following. The food dish is cloned by pressing a button directly in front of the test person, when another food is selected the current one is deleted, if cutlery is needed for the food a fork or knife appears and if eaten up the object is destroyed. In addition, a total of five questionnaires were created via google forms for the test run. These were used to pre-select the test subjects, to record the feeling of hunger and cravings before and after the test, to track the mealwishes and the food eaten after the test. After a trial run with four test persons and subsequent small optimizations, the test phase was started. Eleven pre-registrations for

the test were registered. In order to find test subjects, students and employees were approached and selected on site near the cafeteria. Before the test began, the research project was briefly explained to the test subjects. Afterwards, the questionnaire was filled out on a tablet before the test. After answering the questionnaire, the application in the virtual reality glasses was started (see figure 1). The test subjects decided themselves how long they wanted to eat and could end the test themselves by clicking on the exit sign. At the end of the test the post-test questionnaire was completed. Finally, a final questionnaire was sent to the participants by mail which was to be answered after the next meal consumption.

### 3. RESULTS

The majority of the tested persons are students between the ages of 16 and 27. Of a total of 63 tests, 61 valid tests are included in the evaluation, because the test subjects were only interested in the technology and lost sight of the test scenario. The response rate of the questionnaire to record the amount of food actually eaten and the type of dish was so

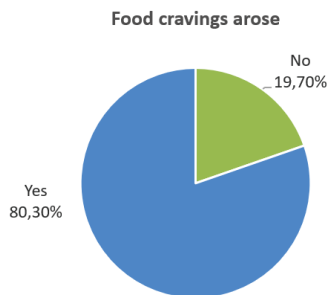


Figure 2: Diagram of food cravings, Janine Riemann

low at 23 responses, that it cannot be taken into account further due to the low representation. The evaluation of the

subjective questionnaires shows a slight improvement in well-being after the test run. Thus a total of three people state that they feel better after the test than before the test. On average, the hunger score on a scale of 0 (not hungry) to 10 (very hungry) increased from 5.5 to 5.8 after the test. The average hunger score increased by 0.3 units. 50.8% of respondents report coming out of the test hungrier. 68.9% do not feel a sense of satiety after the test. Thus 31.1% feel satiated. 19.7% do not feel any food cravings after the test, while 80.3% feel cravings for a particular food (see figure 2). Before the run 42.6% say they want to choose the vegetarian dish in the canteen, 24.6% the meat dish, 9.8% the vegan dish, and 23% other such as salads or sandwiches. After the test run 34.4% want to choose the vegetarian dish, 32.8% the meat dish, 13.1% the vegan dish, and 19.7% other. There is choice, while the vegetarian meal and other meal choice decreases after the test (see figure 3).

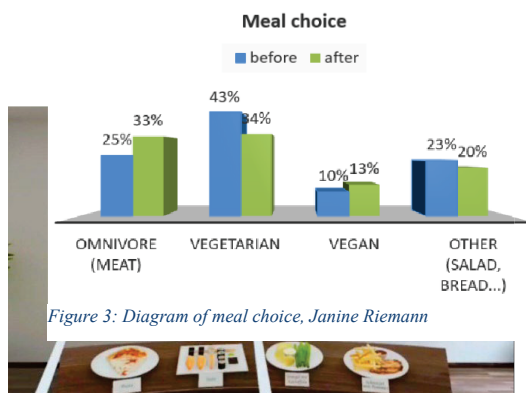


Figure 3: Diagram of meal choice, Janine Riemann

Figure 1: VR-scene setup, Janine Riemann

The most eaten dishes in the virtual reality environment have been sushi and the fruit basket consisting of apples and peaches, closely followed by the pizza and fries.

#### 4. CONCLUSION

With the described test setup it is not possible to clearly deduce from the results and make a clear statement as to whether the feeling of hunger can be influenced with virtual reality or not. The results show reasons that speak both for and against an influence. At this point, further and more precise investigations must be carried out which ideally focus exclusively on the feeling of hunger. Thus test subjects could be accompanied for a week and as soon as hunger arises the test could be carried out. Finally it would have to be asked exactly whether the feeling of hunger is more or lesser afterwards. A study over a longer period of time could also produce a clearer result, as influencing factors could be balanced out due to more frequent testing. An influence on the feeling of well-being and satiety seems to be given, but the influence on the feeling of satiety can be dependent on the individual imagination. Also at this point more exact research could be done in the future to find out the dependencies. Food cravings can also be influenced by virtual reality. The test subjects not only felt cravings for certain dishes afterwards, but in some cases also changed their choice of food in the cafeteria. For the exact reasons, psychological examinations must be carried out in addition to the experimental setup to find out the correlations.

#### REFERENCES

- Coons, M. J. (2011). *The Potential of Virtual Reality Technologies to Improve Adherence to Weight Loss Behaviors*. Journal of Diabetes Science and Technology.
- FRANK, S. e. (2010). *Processing of food pictures: influence of hunger, gender and calorie content*. Brain research.
- Gniech, G. (kein Datum). *Essen und Psyche: Über Hunger und Satttheit, Genuss und Kultur*. 2013: Springer-Verlag.
- Hayes, R.H.; Wheelwright, S.C. (1979). Link Manufacturing Process and Product Life Cycles. Harvard Business Review, Vol. 57, No. 1, pp. 133-140.