ABSTRACT

This paper presents preliminary results of sensory deprivation of one of the senses (visual, auditory, or tactile) during the shaping of a cylindrical vessel on a potter’s wheel. Although there were no significant results between the three types of deprivation, i.e. when one of the three senses was attenuated or deprived (test condition), the results showed significant differences in the final height of the cylinder between the control condition (all the senses were used) and the test condition.

Keywords: Multisensory integration, potter’s wheel, clay shaping and throwing.

Index Terms: [Human-centered computing]: Human computer interaction (HCI) — Interaction paradigms; Empirical studies in HCI.

1 INTRODUCTION

Pottery is a multimodal task that involves visual, auditory, and tactile modalities. Indeed, a potter relies not only on her vision to shape the clay but also on the tactile contact with the clay and the sound produced by the potter’s wheel during the process of creation. In this ongoing study, we compared the potters’ performances to shape a ceramic cylinder when deprived of one sensorial modality. The purpose is to identify whether potters use all the sensory information available during the conception.

1.1 Visual information

While shaping the clay, the visual inputs inform the potter about the speed of the potter’s wheel and the 3D shape of the clay. Although visual information is essential during the process of creation, especially when decorating the clay body after or before firing, it is not enough to fully experience the art of the potter. For instance, potters would never trade their wheel with a virtual one, despite being sometimes exposed to hazardous materials that could affect both health and environment [1]. 3D virtual potters combined with hand gestures [2] or a tablet application [3] allow the user to make astonishing 3D virtual ceramics in less than five minutes that can be later concretized by using a 3D printer [4]. Although the virtual creation is much easier than a real potter’s wheel and it does not require several years of training, the potter experience misses the haptic sense and therefore the contact with the clay that is essential in the art of pottery. An alternative solution to virtual potter applications is the addition of a haptic feedback that could enhance the user experience.

1.2 Haptic information

The tactile nature of pottery makes it a perfect artistic training for visually impaired or deaf-blind people. Indeed, with accurate training and specific instructions, visually impaired could gain more advanced skills with a continuous usage of the potter’s wheel [5]. Another important aspect of the tactile experience is the clay’s response [6]. The potter feels the quality of the clay as it moves on the wheel. A smoother porcelain clay would be instantly felt different on the potter’s wheel and thus making the shaping more challenging; porcelain being the hardest clay to shape [7]. Finally, throwing on the wheel requires mastering the pressure of the hands on the clay that could take several years to fully gain control of the potter’s wheel.

1.3 Auditory information

Potters rely sometimes on the sound produced by the wheel to estimate and vary the speed. It is not uncommon for ceramic artists to close their eyes during the creation process to feel the clay between their hands or listen to the sound of the wheel. However, the deprivation of auditory input seems to not affect the interaction with the clay [8].

2 PILOT STUDY

In order to evaluate the importance of visual, auditory, and tactile feedback during throwing a shape on a potter’s wheel, we asked potters to throw a cylindrical vessel while one of the senses is deprived or attenuated.

2.1 Participants

The participants were 24 ceramic NMU students and faculty (8 males and 16 females) that had between 1 and 240 months of pottery experience. Twenty-one of them declared that they were right handed, and three that they were left handed. The participants’ mean age was 26 (range 18–55). The institutional ethics committee approved the experimental protocol, and participants gave their informed consent before participating.

2.2 Apparatus and Stimuli

Each potter has access to the ceramics studio at NMU. The participants used a Brent model C pottery wheel and its accompanying splash pan. The 14in aluminum wheel head was fitted with a 12in throwing bat. This wheel model has a permanent magnet ¾ hp, 7 amp DC motor, which offers a smooth speed range of 0-240 rpm. They were all given a pugged cylinder of stoneware clay of 680.39 g (approximately 1.5 lbs). A gallon bucket of water, small sponge, and 6in ruler were provided as available tools. The task was to shape a 5in tall cylindrical vessel that is the first type of form that beginner potters have to practice over and over to feel the rhythm of the motion. All participants were familiar with the apparatus and shaping a cylinder. Therefore no training was required.

2.3 Procedure

Ceramic students were asked to shape the clay and were divided into three groups (modality conditions): 1) participants of group 1...
were blindfolded to remove the visual input, 2) participants of group 2 were wearing earplugs and headphones with a NRR of 62dB to prevent them from hearing the sound produced by the potter’s wheel, and 3) participants of group 3 were wearing Nitrile gloves of 15 mil (0.381 mm) that reduce significantly the cutaneous contact with the clay. All the 24 participants shaped a cylindrical vessel under two conditions: a control condition where none of the senses has been altered and a test condition where one of the three senses has been deprived. The two conditions have been randomized across the participants.

2.4 Data Analysis
Ceramic professors may assess their students’ performances by measuring the height and the diameter of the pottery (Figure 1). Besides using the same measurements to compare participants’ final thrown cylinder across both conditions, we also took in account the completion time. A two-way mixed ANOVA with repeated measures of each factor (height, diameter, and time) were performed.

Figure 1: Diameter and height of the round cylinder.

2.5 Results and Discussion
The results showed that the potters adapted very quickly to the task and succeeded to shape the cylinder despite the deprivation of one of their sensorial modalities. There were no significant results for the time and the diameter factors in the three modality conditions. The two-way mixed ANOVA with repeated factor height showed a significant effect between both test and control conditions \[ F(1, 21) = 5.83, p = 0.025 \] but no significant effect for the modality factor. Indeed, Figure 2 shows that the height was always underestimated when one of the three modality is attenuated or removed. This suggests that in order to estimate the height accurately (according to the subjective experience), all the three modalities need to function together.

Figure 2: Height values per condition and per modality

3 Conclusion and Future Perspectives
These preliminary results suggest that despite removing one of the modalities, the participants were able to throw the form in the usual time and with the usual diameter. However, when one of the sensorial modalities was missing, the height of the shaped cylinder decreased significantly comparing to the standard situation when the participants used vision, haptic, and auditory senses all together. The results suggest that when deprived of one of the senses, the height would be lower than the standard height.

In the future, we are planning to ask the participants to perform the task while two modalities are attenuated or suppressed simultaneously. For instance, it would be interesting to evaluate throwing performances when participants are confronted to vision, auditory, or haptic alone.

References