Fundamental Study on Tactile Cognition through

Visually impaired Tactile feedback Tactile memory

【Main Content】:

The paper studies the distinguishing accuracy and storage ability of visually impaired people for tactile information.

【Experiments】:

Aparatus: Tablet device MEDIAS TAB UL N-08D from NEC shown on Fig.1 was used to survey haptic differentiation from touch-screens with haptic feedback function. This device is the first commercial machine that used HD Reverb software from Immersion, and by combining with Immersion's TouchSense 5000 software [12], has the functionality to replicate sensitive haptic sensation with high degree of accuracy.

Fig. 1. Test Tablet Device.

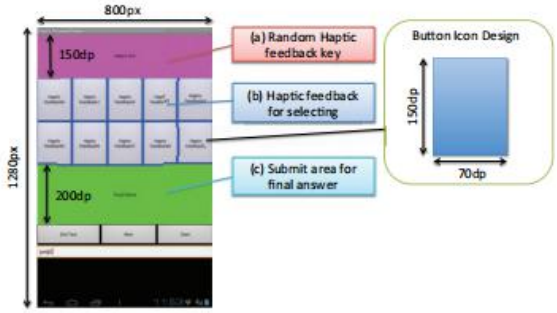

Fig. 2. Appearance of the experimental application.

(The area (a) of Fig.2 shows the area where random virtual haptic sensations are presented. Area (b) is the ten haptic sensation choices set out upon icons on pre-determined locations. Area (c) is the button for making the final submission, after judging what was touched last in (b) is the same as what was presented in (a).)

Procedure:

step1- 10 times exercises

Step2- 30 tactile sensation matching tests, and record in the database

(There is no gap between the two steps above)

Results:

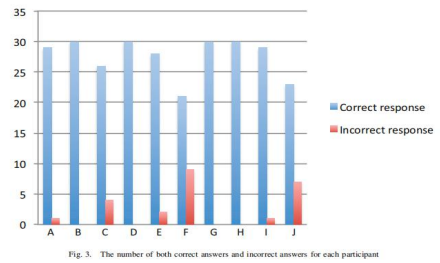

Fig. 3. The number of both correct answers and incorrect answers for each participant

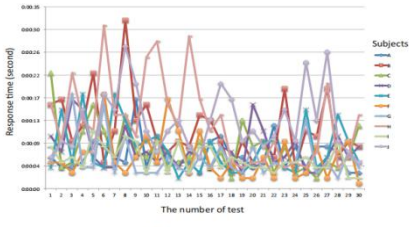

Fig. 4. Response time for each subject

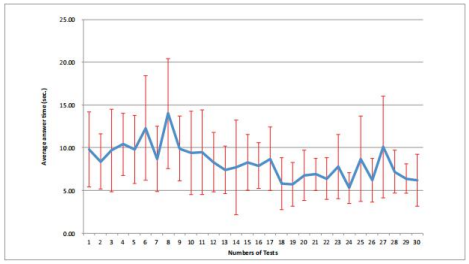

Fig. 5. Average answer time for each test

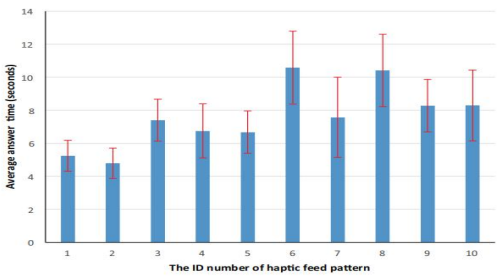

Fig. 6. Average answer time for each haptic feedback pattern.

Although volunteers have some differences in response time, they are only about 3 to 15 seconds, and as the test is repeated, the time required to answer becomes shorter. The interesting fact is that the time required for answering gradually decreases from the 10th time and stabilizes between 15 and 30 times. This may mean that the tactile sensation assigned to the selection icon is partially or fully memorized, and it becomes easier to select the same sensation as the tactile sensation shown in the test.

Discuss:

A. Haptic differentiation rate

Based on the above results, it can be seen that in most cases, the accuracy of virtual haptic discrimination is very high. Therefore, it can be considered that adding a unique tactile feeling to the icon selection operation will be useful for confirming the screen touch operation. In addition, this can be applied in the use of a tactile discrimination type password input system.

B. Answer time

The results show that the relatively short-term tactile sensations can be answered in a short time, while the harder memories take longer. Based on the above, one can consider that virtual haptic patterns become important when used for purposes that require haptic memory. The Immersions API provides more than 100 haptic modes and can also create unique patterns. Therefore, this suggests that in the coming days, further detailed examination of patterns that can be more easily retained in human memory will be needed.

【Subjective analysis】:

Advantages:

The paper use a touch screen with a haptic feedback function to check the discrimination accuracy and memory ability of a person's virtual haptic information. The main focus will be on the results of basic research on visually impaired persons.

Disadvantages:

(1) but it does not explain why the response time of different haptic feedback is different,

(2) His experiments could not tell whether it is helpful for long-term memory.

(3) The paper does not say how long to match after experiencing the random region, nor does it explain how long it can be experienced in the random region. This may have an impact on memory haptics.

Next： Design experiments based on the above deficiencies (1) The impact of tactile sensation time on the matching result (2) The impact of tactile sensation and the length of the interval on the match.

【Important Reference】:

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