

User Operate Consistency of Experience on Daily Commodities

Taipei, Taiwan

Abstract

This research expected to innovation designs can develop by more detail user-experience, that also reduce users unfamiliar and depressed; therefore, we investigated that people cognitive process on operated daily commodities, and we planned a tool to analyze users the area of contact and frequency. In experiment, we selected three objects whose size and shape are similar but haven't limited way of operation. After that, we excluded feature of shape and make them consistent. We studied 30 participants response to operation and affordance, and analysis that by qualitative and quantitative. The result showed the participants have consistent posture of grasp, area of contact and way of operation in the same experimental situation; in addition, even the grip are the same, but following different functional parts, users still response a corresponding way of operation. So we suggest that shape only be as one of design factors on simple design style, and not the main factor. Designer should find other design techniques to enhance the user's cognitive operation.

Research method

3.1. Product selection

The research hoped innovative design that can according detail user-experience on operation in daily commodities; therefore, we selected knife, spoon and wrench that have similar size and shape grasp, but have different operation. After that, we exclude feature of shape and make then consistent; as fig.1.

3.2 Contact frequency

We planned a tool for record users grip area and frequency in operation process in order to explore they have consistent or not, as fig.2. Before users hold props, we have pasted Record Contact Frequency Paper on props, and In experimentation used marker pen to markup users grip area. Finally summed up all of data to analysis.

3.3. Experimental situation

We planned the props that can enhance authenticity of experiment in order to make participants to produce close to real result, as fig.3; therefore, We also planned standardized process.

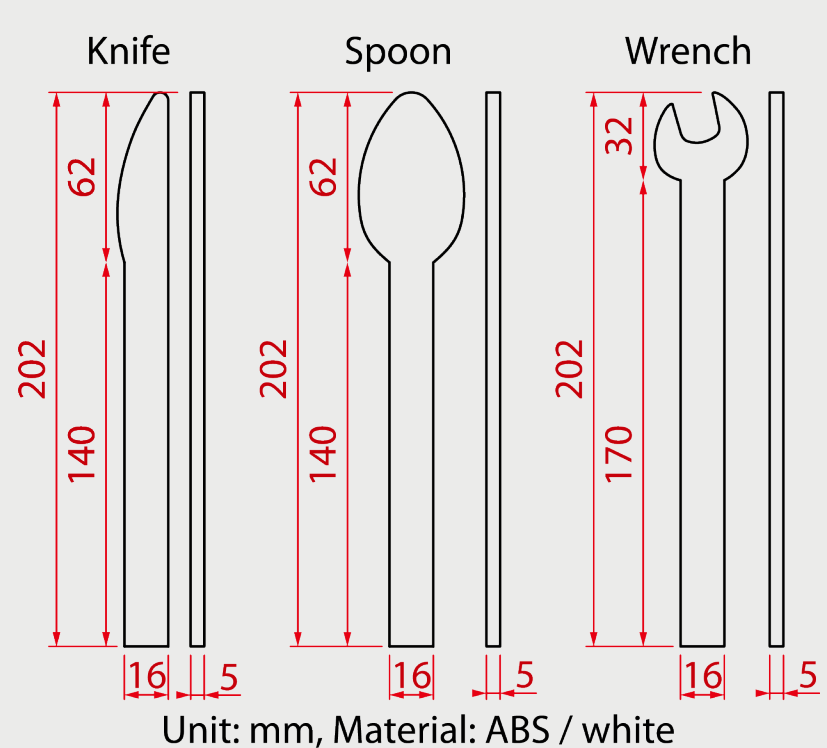


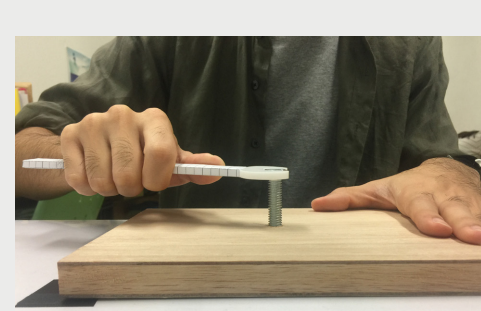
fig.1 Experimental props dimensions



(1) Cutting area (for knife)



(2) Bowl (for spoon)



(3) screw (for wrench)

fig.3 Enhance feeling of situational factors

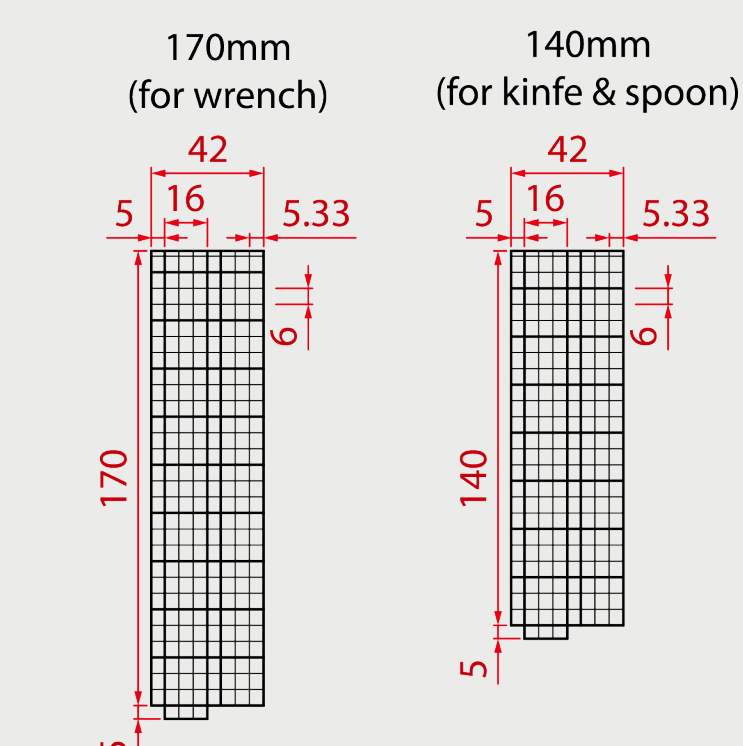


fig.2 Record Contact Frequency Paper

4. Results and analysis

We recruited 15 male and 15 female participants by convenience sampling and purposive sampling, and they have to use right-handed; in addition, they have experience by knife, spoon and wrench, but No.11, 17 participants seldom use experience of knife, it lead they have different way of operation with other participants. We through "Binomial test" to analyze the response of participants were according to "experience" or "situation". Table 1 shows the participants operated knife and spoon mainly according to experience significant more than situation ($p < 0.01$) that stand for most participants will follow their habit for use knife and spoon. On the contrary, the participants have different decision in operation of wrench, but most people according to situation more than experience. After that, We further analyze detail that users were according "experience" or "situation" in the process of operation by Qualitative analysis. Table 2 show the participants were in grasp posture and operation of knife and spoon, they according to experience more than situation. especially, they were in knife, wrench and spoon of grasp position, and they most according to situation; in addition, they operate knife and spoon according to experience more than situation, but wrench was opposite. The result of table 2 were consistent with the result of table 1. Most participants used knife and spoon according to experience, On the contrary, wrench were according to situation.

Next, we used Binomial test to analyze frequency which participants contact area of grip, the results are visualized and combine video data to analysis. As fig4 showed, the darker the color of the square grid, the higher the contact frequency; in addition, the white number was the area of high-frequency ($p < 0.05$ / significant higher than 50% participants have contact), the black number was the area of medium-frequency ($p > 0.05$), the red number was the area of low frequency ($p < 0.05$ / significant lower than 50% participants have contact) and the gray number was the area of non-contact. Fig 5~9 was 3D visual results which analyze participants contact frequency, area and posture about knife, wrench and spoon.

5. Conclusion

According to analysis results showed participant operated product will rely on interaction both experience and situation, and not only depend on either. But participants rely on the degree with experience or situation, that will be difference with different product. For example, they operated knife and spoon refer to according to experience more than situation, but they operated wrench refer to according to situation more than experience. However, more interesting discovery Even participants have different gender, background, the size of hand, product of non-limited operation, but they operation and the area of grasp come to consistency in the same experimental situation. We suggest that shape only be as one of design factors on simple design style, and not the main factor, because we considered aims more important than shape, it effectively affect their perceived process. Therefore, designer except metaphorical design, the cue of shape, printing icon to create the cue, they can try to a new way. For example, pattern design in product surface, before pattern most use to increase non-slip function. Current productive technique better and better, designer could create many complex patterns on product surface, that can provide great visual effect. But that only focus on aesthetic, we could combine more cue to improve that get more information.

Table.1 Result of Binomial test

	According	N	Mean rank	p
Knife	Experience	29	49.50	.001*
	Situation	21	5.50	
Wrench	Experience	20	40.00	.197
	Situation	25	80.00	
Spoon	Experience	29	31.50	.034*
	Situation	23	4.50	

*= $p < 0.05$

Table.2 Result of qualitative analysis

	Grasp posture	Grasp position	Operation
Knife	AQE=67.14@	AQE=45.97	AQE=59.00@
	AQS=33.76	AQS=54.93@	AQS=41.90
Wrench	AQE=54.12@	AQE=37.83	AQE=45.97
	AQS=46.79	AQS=63.07@	AQS=54.93@
Spoon	AQE=64.70@	AQE=43.53	AQE=50.86@
	AQS=36.21	AQS=57.37@	AQS=41.90

@=more than other option, AQE=According Quantity of Experience, AQS=According Quantity of Situation

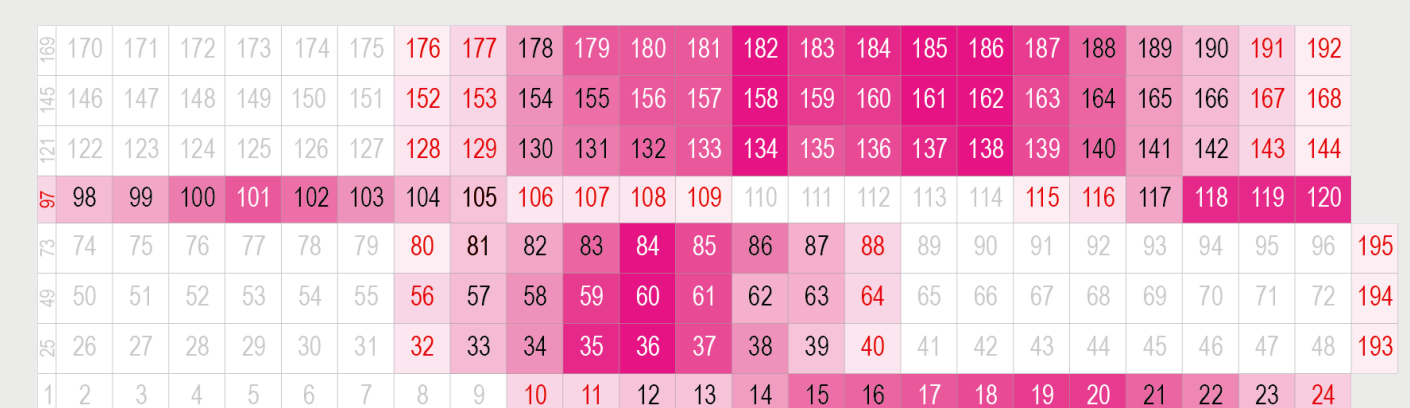


fig.4 2D visual result of contact frequency

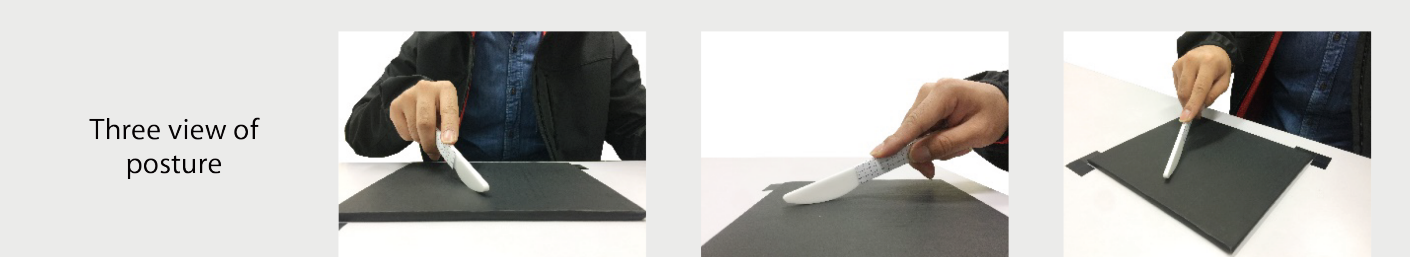


Figure 5: 3D visual result and posture grasp the posture-1 of knife

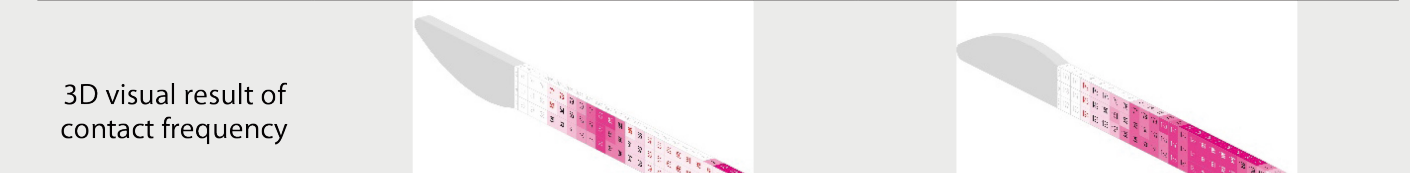
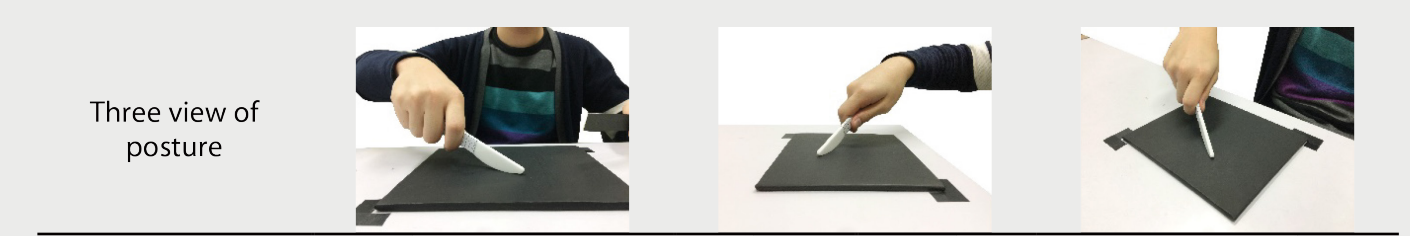


Figure 6: 3D visual result and posture grasp the posture-2 of knife

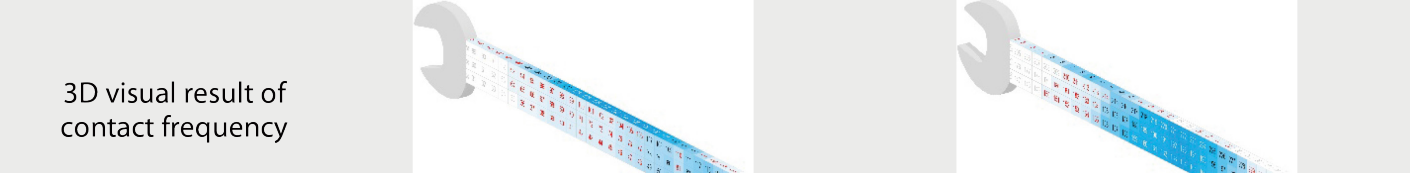
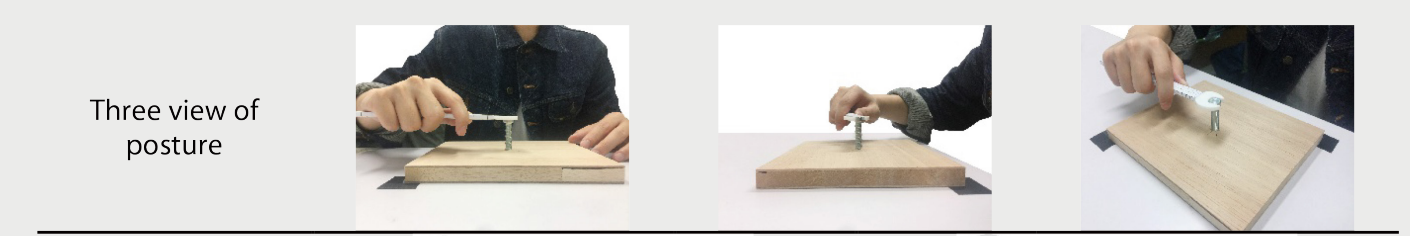


Figure 7: 3D visual result and posture grasp the posture-1 of wrench

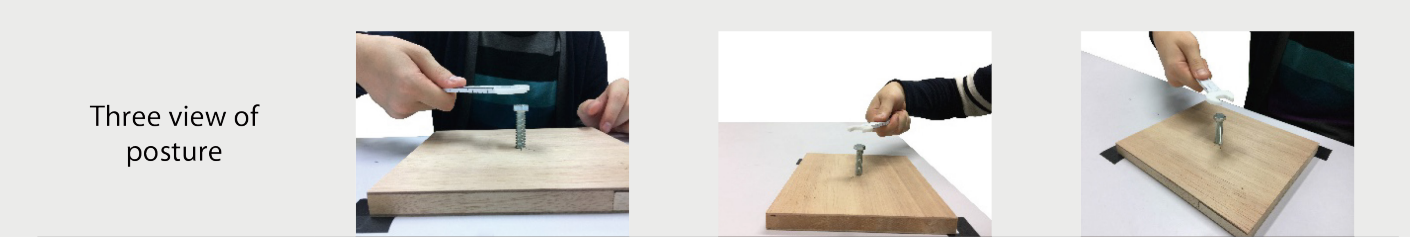


Figure 8: 3D visual result and posture grasp the posture-2 of wrench

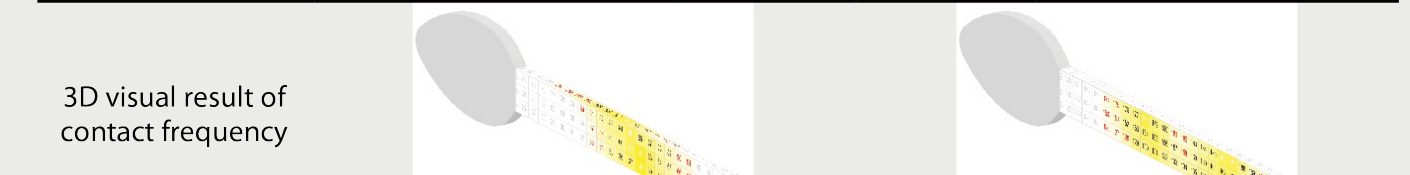
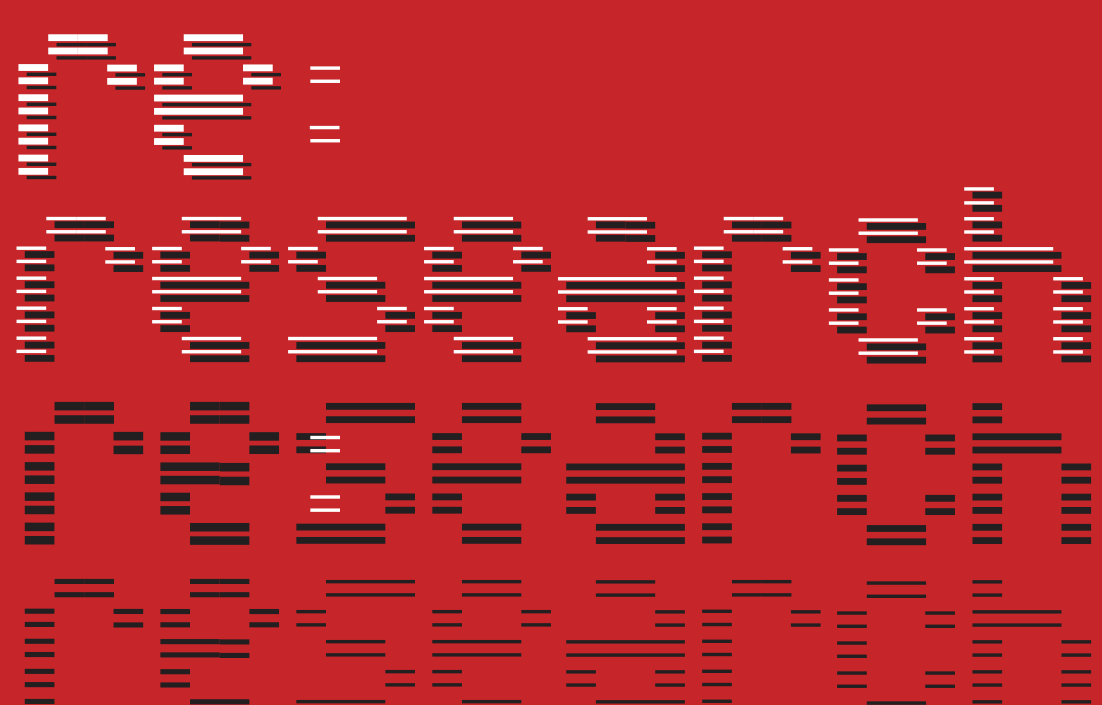


Figure 9: 3D visual result and posture grasp the posture-1 of spoon



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