



Workers' Feelings about Work Spaces: Evaluative Methods and Design Principles

慶應義塾大学

Takahiro KATAGIRI, Tadahiko FUKUDA: Keio University, JAPAN (chau@sfc.keio.ac.jp)

Abstract

The purpose of this study is to develop an approach to evaluating work spaces in terms of the feelings of workers using work apparatus, with a particular emphasis on the importance of age and handedness in workers' subjective impressions of the work space. We argue that the design of work spaces must take into account the feelings of workers.

Method

Subjects

Youth: 20 right-handers & 20 left-handers. (mean=20.6 yrs.)

Elderly: 20 right-handers. (mean=58.1 yrs.)

Using the handedness test, the dominant hand of each subject was determined.

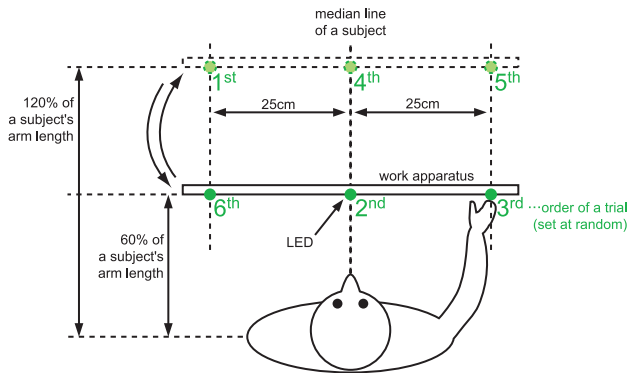
Procedure

We instructed a subject to stand upright with not tense posture and touch a lit light-emitting diode (LED) on a work apparatus, then he/she was asked to fill in a questionnaire which made inquiries about the subjective impressions of this task made of 20 seven-step SD scales.



This series of processes consisted as 1 trial.

For each subject, 6 trials were conducted. The setup of trials are presented below. The order of trials was randomized.



The height of LEDs were adjusted to the shoulder-height of each subject.

SD scales

1. far - near
2. tired - relaxed
3. lateral - central
4. comfortable - uncomfortable
5. high - low
6. positive - negative
7. strong - weak
8. waver - unequivocal
9. constrained - free
10. heavy - light
11. large - small
12. intentional - unintentional
13. fast - slow
14. stable - changeable
15. complete - incomplete
16. kind - cruel
17. moderate - violent
18. reasonable - unreasonable
19. healthy - sick
20. easy to touch - difficult to touch

Results

Factor loadings of the SD scores by factor analysis.

Youth:

		Factor: 1	2	3	4
far	near	-0.80	-0.19	0.03	0.21
constrained	free	-0.77	-0.09	-0.08	-0.09
tired	relaxed	-0.76	-0.32	0.15	0.14
comfortable	uncomfortable	0.76	0.37	-0.12	0.04
kind	cruel	0.75	0.33	-0.02	0.08
easy to touch	difficult to touch	0.70	0.59	-0.12	-0.03
reasonable	unreasonable	0.60	0.37	-0.17	0.24
fast	slow	0.10	0.70	0.06	-0.05
stable	changeable	0.42	0.68	-0.03	-0.06
strong	weak	0.04	0.08	0.77	0.15
large	small	0.01	-0.05	0.59	0.04
positive	negative	-0.09	0.18	0.28	0.58
healthy	sick	0.46	0.08	0.25	0.52
high	low	-0.05	-0.17	-0.01	0.33
complete	incomplete	0.52	0.51	-0.12	0.28
intentional	unintentional	-0.48	0.18	-0.10	0.26
lateral	central	-0.47	-0.20	-0.08	0.02
waver	unequivocal	-0.25	-0.52	0.03	-0.01
moderate	violent	0.42	0.18	-0.41	-0.07
heavy	light	-0.42	-0.29	0.03	-0.13
rate of contribution (ROC) (%): 36.74 10.64 7.88 6.54					
accumulative ROCs (%): 36.74 47.38 55.26 61.80					

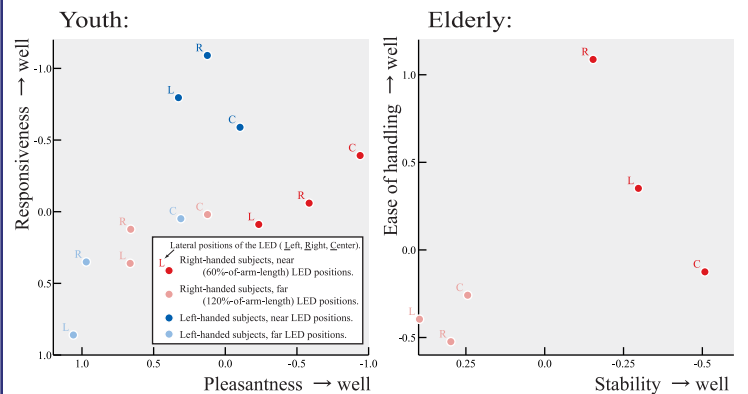
Elderly:

		Factor: 1	2	3	4
reasonable	unreasonable	0.82	-0.04	0.25	-0.38
moderate	violent	0.81	-0.30	0.25	-0.04
easy to touch	difficult to touch	0.80	-0.16	0.12	-0.24
complete	incomplete	0.78	0.04	0.19	-0.16
kind	cruel	0.72	0.21	0.30	-0.12
stable	changeable	0.72	-0.06	0.21	-0.34
healthy	sick	0.65	-0.31	0.26	-0.24
far	near	-0.61	0.61	-0.21	0.12
large	small	-0.11	0.77	0.14	-0.04
strong	weak	0.09	0.73	0.08	-0.22
heavy	light	-0.26	0.56	-0.41	-0.22
tired	relaxed	-0.35	0.56	-0.23	0.30
waver	unequivocal	-0.09	0.13	0.79	0.19
positive	negative	0.35	0.29	0.57	0.07
lateral	central	-0.40	0.05	-0.01	0.81
intentional	unintentional	-0.10	0.25	-0.09	0.62
constrained	free	-0.53	0.51	-0.15	0.44
fast	slow	0.51	-0.13	0.55	0.07
high	low	-0.32	0.25	0.05	0.00
comfortable	uncomfortable	0.44	0.15	0.44	-0.08
rate of contribution (ROC) (%): 43.79 13.39 7.04 6.38					
accumulative ROCs (%): 43.79 57.18 64.21 70.59					

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Distribution of factor scores of top 2 factors for each LED position for the young and the elderly subjects.



Discussion

The obtained factors between the young and the elder subjects were different. We thought this was due to the difference of the muscular strength between generations. All subjects had a better feeling at the central, near position than the other positions. We consider that the central position was within their field of view, and therefore it was easier to find than side positions, and that the subjects preferred natural motions rather than leaning forward. We believe that the evaluation of workers' subjective impressions as well as consideration of the measurements of working areas results in cost reduction from not only the economic but also the psychological point of view.