

図4 研究の流れに関する概念図

(6) 期待される成果

本研究により得られる成果は、一連の利活用促進要素を円滑に進めることにより、障害者の自立・自律や社会参加をさらに進めることが期待できる。また、利活用を促進するための福祉用具法の見直しにつながる根拠を提示する成果も期待でき、福祉用具の研究・開発・普及に新たなパラダイムを提案する可能性がある。

5. 海外の状況

米国においては、ピッツバーグ大学とカーネギー・メロン大学の共同で「QOL Engineering Technology Center」の研究開発(NSFプロジェクト)が現在行われている。ここでは、先端技術による高齢者・障害者のQOLの向上を目指した実証的研究開発が進められている。1990年代後半に実施されたEUのFORTUNEプロジェクトでは、福祉機器の開発プロセスへの当事者参加の方法を具体化し、実証している。しかし、「適合」まで含めた利活用・開発サイクルとしての捉え方までは至っていない。

6. 結論にかえて

福祉機器・支援機器の開発における課題の調査分析によって、従来あまり正面から検討されてきていなかった問題点を明らかにした。一つは、「売れていない福祉機器・支援機器の問題」であり、もう一つは、「遊休状態の福祉機器・支援機器の問題」である。さらに「ハイリスク・ローリターン」の技術分

野であるとの認識が、技術開発と商品開発の関係者のインセンティブを大きく損なっていることによる問題、ならびに当事者からこれから出現する技術による支援への「ニーズを引き出すことの困難さ」等を明らかにした。

これらの問題点を踏まえ、福祉機器・支援機器の利活用を促進し“使われる”福祉機器・支援機器の開発目標を達成するための基本戦略を検討し、福祉機器・支援機器の“開発－利活用サイクル”の(再)構築を目指す実践的研究の必要性を示し、研究計画の事例を提案した。このサイクルは、福祉機器・支援機器の進化を促す効果も期待できることを示した。

総合研究成果の刊行に関する一覧表

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## 雑誌

平成 20 年度

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
INOUE,T,KAM IMURA,T,SAS AKI,K., MORI,K.,SAKA I,N.,FUJITA,Y., NIHEI,M., TSUKADA,A.	Standardization of J-PIADS (Psychosocial Impact of Assistive Devices Scale)	Proceedings of 23rd JCAART		145-146	2008

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Motoi SUWA	Current and Future Rehabilitation Research in Japan	Proceeding of International Conference for the First Anniversary of NRC Research Institute			2009
Takenobu INOUE	The overview of research tasks of Department of Assistive Technology, Research Institute,NRCD,Japan.	Proceeding of International Conference for the First Anniversary of NRC Research Institute		99-100	2009

総合研究成果の刊行物・別刷り

## Standardization of J-PIADS (Psychosocial Impact of Assistive Devices Scale)

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### 1 Introduction

Assistive products, which have important functions in supporting the life of persons with disability, are widely used through the benefits of assistive equipments and daily life tools and through the lending or benefit system of long term care insurance in Japan. At the same time, it is becoming an increasingly important issue to evaluate the effects of using such products.

Since assistive products are tools that are close to the user's life, it is necessary to choose and develop them by putting oneself in the user's place. For this reason, the psychological evaluation of assistive products is essential. In addition, changes in the user's psychology sometimes result in more independence in their daily lives and the reduction in care burden. But the standardized way of determination that explains such situation is not yet established.

The goal of this research is to develop an objective evaluation scale that defines the user's psychosocial impact of assistive products. Therefore we focus on PIADS (Psychosocial Impact of Assistive Devices Scale), which is widely used in America and Europe. We made a Japanese version and inspected its reliability and validity.

### 2 Formulation of J-PIADS

PIADS is the evaluation scale which Jutai and Day developed<sup>1)</sup>. There are 26 items in the scale. The PIADS is translated into French, Swedish, Spanish, Chinese and so on. The J-PIADS, which we made in this project, is an evaluation scale that target users of

assistive products, and evaluates how users feel himself/herself with using their assistive products. The questions are the following.

- Users answer 26 items (Competence, Happiness, Independence, Adequacy, Confusion, Efficiency, Self-esteem, Productivity, Security, Frustration, Usefulness, Self-confidence, Expertise, Skillfulness, Well-being, Capability, QOL, Performance, Sense of power, Sense of control, Embarrassment, Willingness to take chances, Ability to participate, eagerness to try new things, Ability to adapt to the activities of daily living, Ability to take advantage of opportunities) with seven-level rating system (-3 to +3).
- Scores on the PIADS are summarized in 3 important quality of life domains which are subscales of the PIADS: Adaptability (reflecting inclination or motivation to participate socially and take risks), Competence (reflecting perceived functional capability, independence and performance), Self-esteem (reflecting self-confidence, self-esteem, and emotional well being).

### 3 Reliability and Validity

In this project, we examined the reliability and the validity by investigating the users of eye glasses, contact lenses, wheelchairs and prostheses. We also inspected the validity by evaluating with this scale before and after the introduction of dysphemia reducing devices. The subject attribution of each product is shown on Table 1.

Table 1 Subject attribution

Products	Number of Subjects (Male, Female)	Age	Remarks
Eye glasses	22 (3, 19)	26.4 ± 1.9	
Contact lenses	20 (0, 20)	26.4 ± 1.9	
Wheelchairs	22 (20, 2)	40.2 ± 7.6	Manual:7, Electric:15
Prostheses	14 (13, 1)	57.9 ± 12.9	Above knee: 9, Below knee: 3, Below knee and above knee:1, Both arms: 1
Dysphemia reducing devices	4 (2, 2)	30.5 ± 14.2	Metronome:2, DAF (Delayed Auditory Feedback) :2

Table 2 Results of reliability tests

Test-retest	Total	Eye glasses	Contact lenses	Wheelchairs	Prostheses
		0.82	0.92	0.74	0.87
Pearson Coefficient	Competence	0.83	0.86	0.63	0.94
	Adaptability	0.93	0.94	0.78	0.96
	Self-esteem	0.75	0.91	0.69	0.80
Internal Consistency Cronbach α	Total	0.96	0.97	0.93	0.94
	Competence	0.92	0.95	0.87	0.84
	Adaptability	0.92	0.93	0.84	0.94
	Self-esteem	0.89	0.90	0.79	0.75

Table 3 Results of dysphemia reducing devices

Subject	Frequency of stammering (%)		PIADS total score
	Before	After	
A	24	5 - 25	27
B	35	22	17
C	62	4-12	42
D	40	11-18	38

The result of the test-retest reliability and internal consistency, which are instituted on the users of eyeglasses, contact lenses, wheelchairs and prostheses, is shown on Table 2. In the test-retest method, we did the same examination twice 3 weeks periods, and calculated its Pearson's correlation coefficient. We used Cronbach's coefficient alpha in calculating internal consistency.

From results of test-retest, we confirmed that the total score and the sub-scale score of Competence, Adaptability and Self-esteem are reliable enough. And from the result of Cronbach's coefficient alpha, we also verified the reliability of internal consistency. In this way, each score can be on a highly reliable scale.

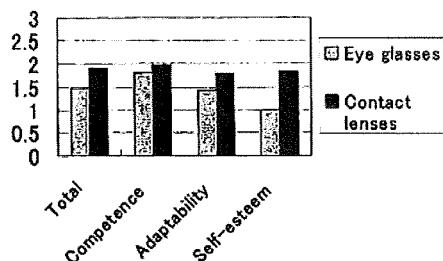


Fig. 1 PIADS score of eye glasses and contact lenses

Fig.1 shows the PIADS score of eye glasses and contact lenses. All scores of contact lenses are larger than these of eye glasses. These results indicated similar trend to the results of English version of PIADS<sup>1)</sup>. So, validity of J-PIADS is supported by these results.

We also investigated the effect of behind the ear metronome and DAF (Delayed auditory feedback) as dysphemia reducing devices after four stuttering adults had used them (two had used metronome and the others DAF) for between 6 months to 20 months, and evaluated their psychological impacts with PIADS. Table 3 shows the results of the evaluation of telephone speech and PIADS total score. Subjects who have more reduction of the frequency of stuttering tend to indicate larger psychological impact. These results prove the scales to be valid.

#### 4 Conclusions

We formulated a J-PIADS as a scale that evaluates the psychological impact of assistive products. This scale is composed of 26 items: competence subscale, adaptability subscale and self-esteem subscale. The investigation that was conducted on the users of eye glasses, contact lenses, wheelchairs and prostheses proves the scale to be reliable enough. In addition, the inspections that was conducted on the users of eye glasses, contact lenses and dysphemia reducing products support validation of J-PIADS.

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#### 5 Reference

1) Jutai, J.: Quality of life impact of assistive technology, Rehabilitation Engineering, 14 (1), 2-7, 1999

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## **Introduction of Activities of Research Institute, NRCD, Japan --- Towards Promotion of QOL of persons with disabilities ---**

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National Rehabilitation Center for Persons with Disabilities (NRCD), Japan

### **1. Introduction**

The National Rehabilitation Center for Persons with Disabilities (NRCD) was established in 1979. Five years after the establishment, Research Institute started its R&D. The Research Institute initially consisted of six research divisions covering wide range of field such as Medical Science, Engineering, Psychology and Social Science, and PO, so that interdisciplinary studies can be conducted. Last year, Information Center for Persons with Developmental Disabilities was newly established, which shows the fact that our research fields is being expanded out of physical disabilities.

### **2. Mission of the Research Institute**

The mission of the Research Institute is to provide technologies and systems of promoting the quality of life, independence and autonomy of persons with disabilities, and assisting their social participation.

Our country, other countries in the world as well, has experienced, still in transition, many changes in QOL of people with disabilities, and old people over the past thirty years. These changes have been driven by advancements in science and technology, by the self advocacy of people with disabilities, as well as aging of the society.

### **3. Overview of the research projects**

Research Institute puts the focus on 1) rehabilitation technology, 2) adaptation technology, 3) assistive technology.

### **4. Two Examples of Current Project**

1) *Nuerorehabilitation*: Advances in medical rehabilitation have resulted in longer and more normal life spans for individuals with disabilities such as those with spinal cord injury. Regeneration and pharmaceutical research hold promise for future breakthrough. Since neurorehabilitaion is relatively new field in clinical rehabilitation and the theoretical base of neurorehabilitation is fully scientific containing the theme such as neural plasticity and neural regeneration.

2) *Brain-Machine Interface*: a newly developing interface technology that utilizes neurophysiological signals from the brain to control external machines or computers. In our preliminary experiment, the BMI-ECS was used by a subject with spinal cord injury at C3/C4 to control a desk-light. He succeeded in turning on/off the desk-light, and in dimming/brightening without any errors. The system is useful for environmental control for persons with disabilities without significant trainings. One of the future directions of the studies can be to built BMI based intelligent houses.

### **5. Concluding Remarks**

Importance of the role the Reseach Institute has been playing in governmental activities for person with disability is increasing for promotion of QOL of PWDs.



## The overview of research tasks of Department of Assistive Technology, Research Institute, NRCD, Japan.

Takenobu INOUE,

Director, Department of Assistive Technology, RI, NRCD, Japan

### 1. Introduction

Assistive technology is important items that support activities and participation of persons with disabilities. The mission of the department of assistive technology, RI, NRCD, is "Promoting QOL of persons with disabilities by research about development, evaluation and fitting of assistive technologies". Our motto is "Research with persons with disabilities". All of our research projects are based on users' needs and conducted with users.

### 2. Overview of the research projects

We have mainly four categories of the projects;

- 1) development and evaluation of prosthetics and orthotics,
- 2) development and evaluation of mobility aids,
- 3) development and evaluation of information and communication aids, and
- 4) development and evaluation of assistive products for persons with dementia. Some of our projects are shown in this paper.

### 3. Standardization of seating systems

There is no Japanese Industrial Standard (JIS) of seating systems. We developed the standard of them for assistive product provision system of Ministry of Health, Labor and Welfare. Now, we are taking some testing data for maintenance of the standard.

### 4. Development of intelligent powered wheelchairs

This project is collaborative project among AIST, University of Tokyo and NRCD from 2006 to 2008. We developed 4 new interface technologies and 3 safety technologies for persons with severe disabilities, who can't use current commercialized wheelchairs (Figure 1). The all technologies were demonstrated by real users in practical field.

### 5. Development of a daily-plan indicator for persons with dementia

This project is one part of our new challenge of assistive products for persons with disabilities. We proposed the field-based development method and developed and evaluated a daily-plan indicator. We are planning development of communication robot for persons with dementia as a future work.

### 6. Summary

Human, life and products are our key word for R&D of assistive products. We apply not only engineering but also sociology, psychology, pedagogy, economics and medicine to AT research in order to accomplish our mission.

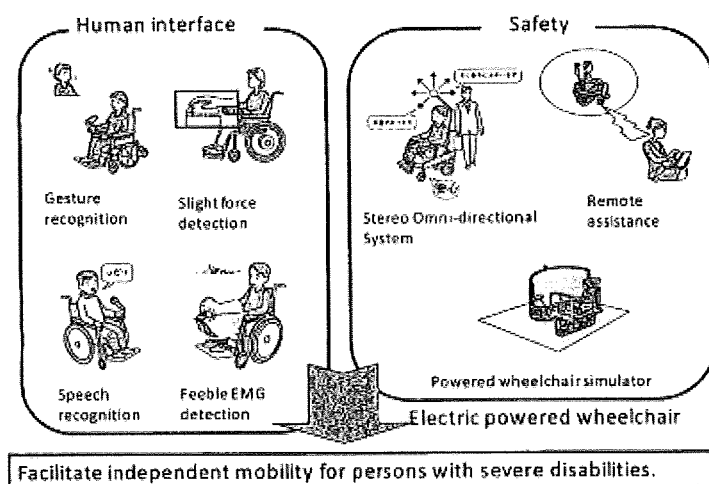


Figure 1 Development of intelligent wheelchairs

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