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Creation and Expansion of a Japanese Typeface Designed for Readers with Dyslexia

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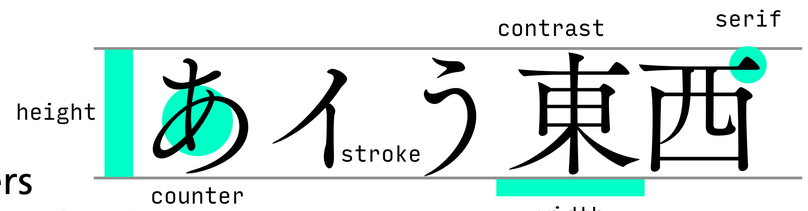
Introduction

- Research regarding Japanese typefaces and readers with developmental dyslexia implies **the possible effectiveness of Japanese typefaces designed for readers with dyslexia**, which have not been created so far.
- In previous research, we defined **the requirements for Japanese typefaces** designed for readers with dyslexia.
- In this research, we aim to **create a new Japanese typeface** that fulfills the requirements defined and **evaluate its effectiveness**.

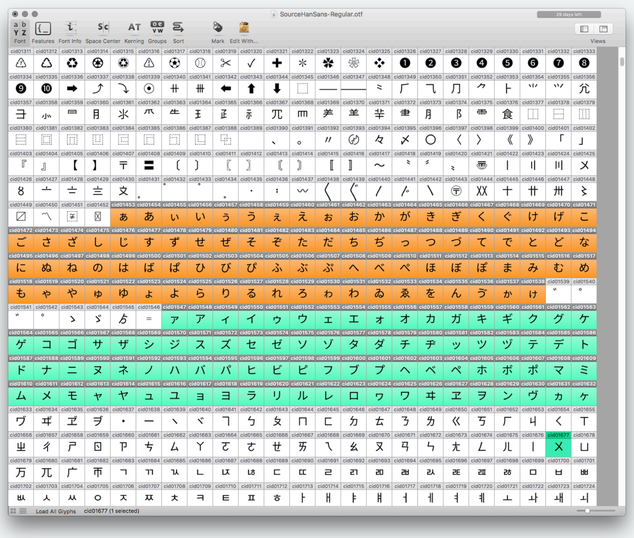
Requirements for Japanese Typefaces



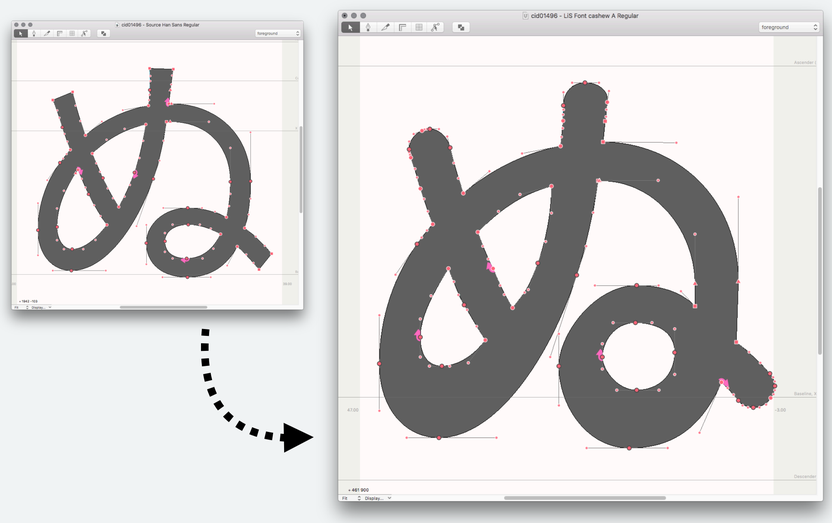
A. Larger characters
B. Rounded sans serif style
C. Bolder strokes
D. Larger height/width ratio
E. Contrast in strokes
F. Characters of similar shapes made easy to identify
G. Frames added to illustrate kanji structure

Creation and Expansion of a New Japanese Typeface

1 Selecting an existing Japanese typeface (Source Han Sans) as a base font

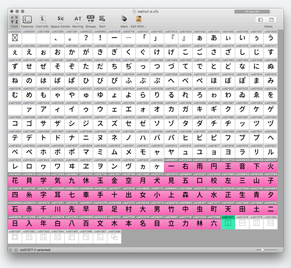


2 Applying the requirements for Japanese typefaces designed for readers with dyslexia to the base font to generate new fonts

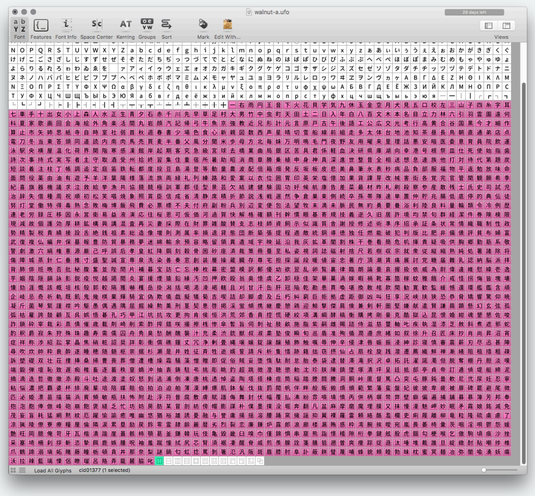


3 Expanding character collections to meet the demands of daily use

274 characters



2,778 characters



4 Two versions of the new Japanese typeface designed for readers with dyslexia have been created

LiS Font walnut (walnut)
りすフォントくるみ

LiS Font cashew (cashew)
りすフォントかしう

Each contains latin characters, hiragana characters, katakana characters and jōyō (regular-use) kanji characters.

Preliminary Evaluation

Methods

- **Rapid reading tasks**
  - duration time and number of errors are recorded
- **Interview regarding most and least readable typefaces**

Materials

Eight kinds of stimuli
- Two kinds of written materials (text and random kana characters)
- Four kinds of typefaces

LiS Font walnut (walnut) りすフォントくるみ
LiS Font cashew (cashew) りすフォントかしう
Hiragino Maru Gothic (maru) ヒラギノ丸ゴシック
Hiragino Mincho (mincho) ヒラギノ明朝

Participants

Six children who have symptoms of dyslexia (mean[±SD] age, 10.17±1.47 years)

Qualitative Analysis

ID	Most readable typeface		Least readable typeface		Type of miscues					Symptoms of reading difficulties
	Text	Random characters	Text	Random characters	Skipping	Error	Addition	Correction	Repetition	
1	maru	walnut	mincho	cashew	20%	20%	10%	50%	0%	Making errors when reading
2	walnut	walnut	mincho	mincho	24%	19%	24%	10%	24%	Making errors when reading/Lack of reading fluency
3	walnut	cashew	mincho	mincho	11%	15%	17%	28%	28%	Lack of reading fluency/Not good at reading kanji characters
4	cashew	walnut	mincho	mincho	4%	13%	8%	38%	38%	Making errors when reading/Skipping characters and lines
5	maru	maru	cashew	mincho	0%	10%	35%	35%	20%	Seeing non-existent shapes when reading
6	walnut	maru	cashew	cashew	40%	20%	10%	30%	0%	No symptoms of reading difficulties

Conclusions

- Subjective readability implies **a significant difference** between four kinds of typefaces.
- Participants with **similar symptoms of reading difficulties** may have **similar preferences of typefaces**.
- Type of miscues may be related to preferences of typefaces.

Outlooks

In future research,
- The requirements for Japanese typefaces for readers with dyslexia should be elaborated;
- Relationship between objective and subjective readability should be explored.

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References
1. Tani, N., Goto, T., Uno, A., Uchiyama, T., & Yamanaka, T. (2016). The Effects of Font Type on Reading Aloud in Japanese-Speaking Children with Developmental Dyslexia [in Japanese]. The Japan Journal of Logopedics and Phoniatrics, 57(2), 238–245.
2. Shimada, Y. (2013). Miscue Analysis of Reading Difficulties—Making Norms of Miscue Analysis on the Oral Prose Reading Task— [in Japanese]. Research Bulletin of Naruto University of Education, 28, 24–38.