

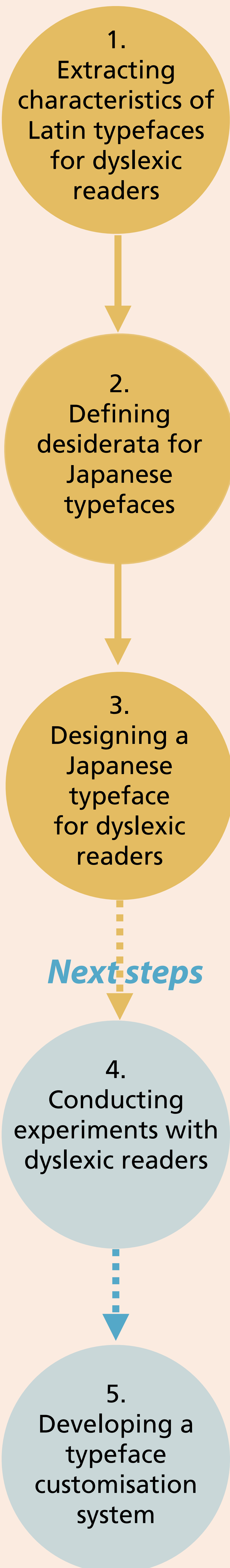
Background

- Developmental dyslexia is a specific learning disability that is neurobiological in origin, characterised by **difficulties with accurate and/or fluent word recognition**.
- **3–5%** of the population in Japan have dyslexia.
- It is essential to provide them with assistive environments.
- While it is held that **typefaces have impacts on dyslexic readers**, Japanese typefaces for dyslexic readers do not exist.

Aim

- It is not easy to design a Japanese typeface for dyslexic readers which **fits everyone** and completely **manually**.
- This research aims to develop:
 - (i) **a specially designed Japanese typeface**, and
 - (ii) **a typeface customisation system**
 for dyslexic readers, by using **Python libraries and scripts** for font manipulation.

Framework of the research



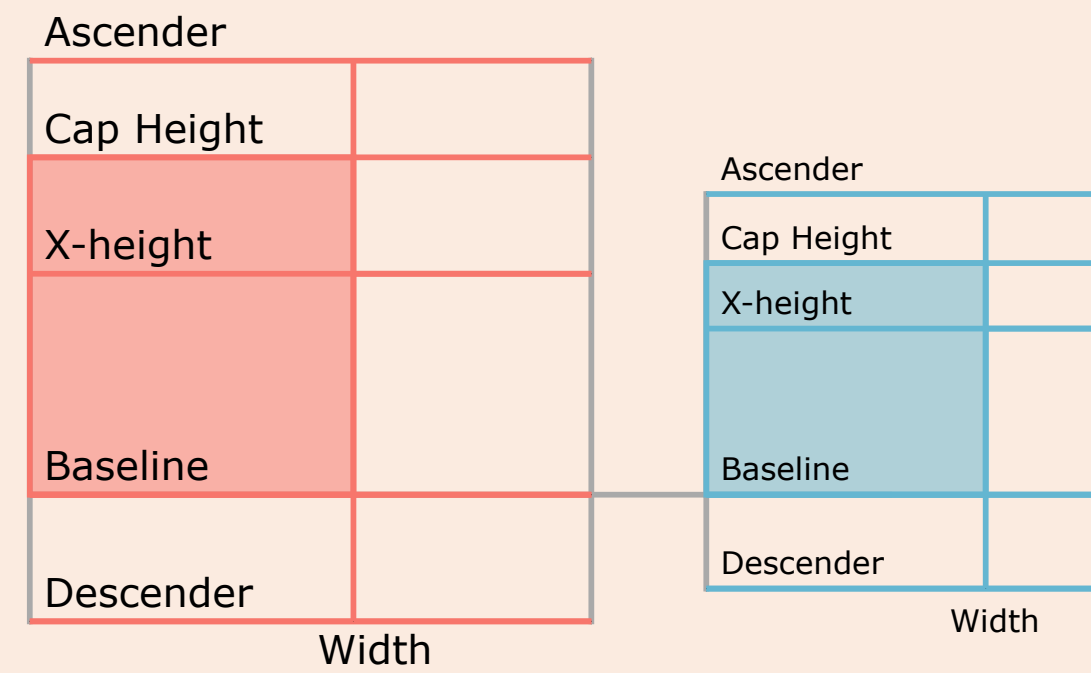
1. Characteristics of Latin typefaces for dyslexic readers

Dyslexie
OpenDyslexic
Lexie Readable

Measured and/or compared the **elements of typefaces**:

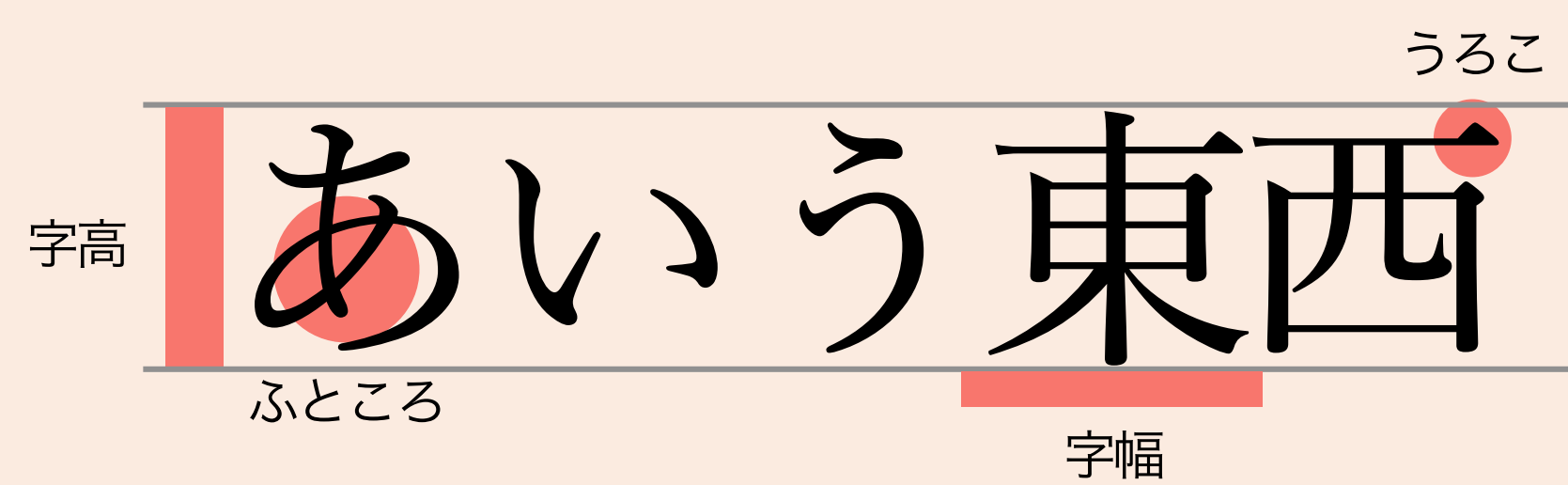
1. Sizes of glyphs
2. PANOSE values
3. Direct comparison

Arial
Calibri
Verdana
Trebuchet
Comic Sans
Sassoon Primary



- (a) Larger letters in the same size,
- (b) Larger **height/width** ratios,
- (c) Standard x-heights,
- (d) Rounded sans-**serif** typefaces,
- (e) Bolder **strokes**,
- (f) Contrast in stroke **weight**,
- (g) Similar letters made distinguishable by
 - (i) Larger **counters**,
 - (ii) Slanted or rotated to opposite directions,
 - (iii) Changed shapes slightly,
 - (iv) Replaced by other letterforms.

2. Desiderata for Japanese typefaces for dyslexic readers



Elements of Latin typefaces	Elements of Japanese typefaces
Cap Height	字高 (jiko)
Width	字幅 (jihaba)
Stroke	画線 (kakusen)
Weight	線幅 (senhaba)
Contrast	線幅の配分 (—no-haibun)
Counter	ふところ (futokoro)
Serif	うろこ (uroko)

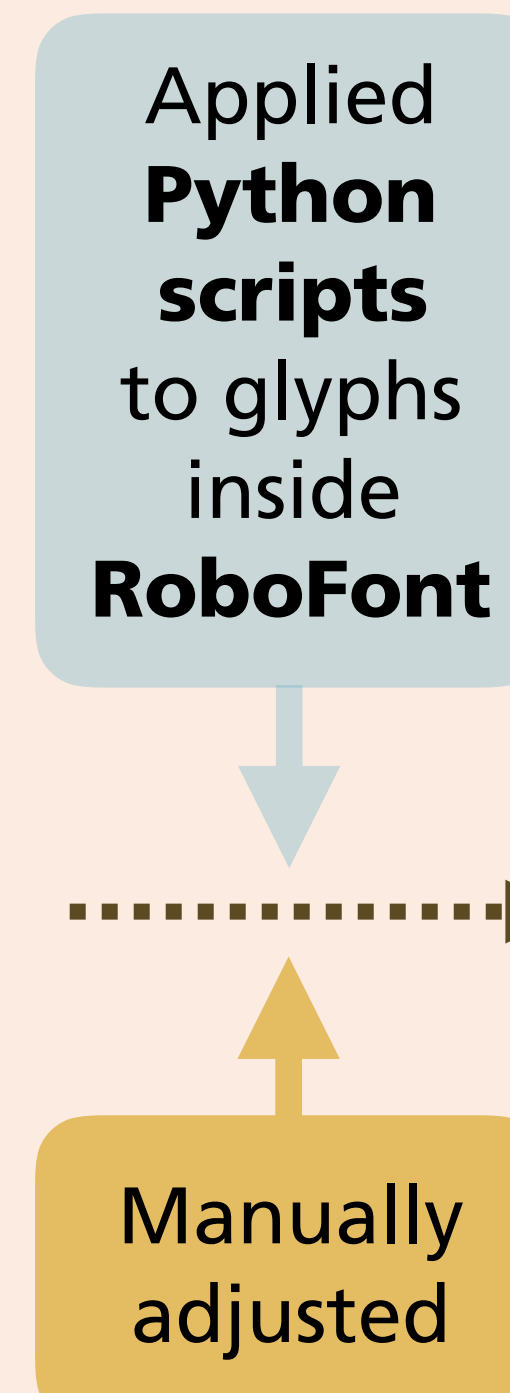
1. Symptoms of dyslexia in alphabet-using languages are similar to those in Japanese.
2. Recognition processes of phonograms (alphabet and kana) are similar.

- (a) Larger characters in the same size,
- (b) Larger height/width ratios,
- (c) Rounded san-**serif** (*maru gothic*) typefaces,
- (d) Bolder strokes,
- (e) Contrast in stroke weight,
- (f) Similar characters made distinguishable by
 - (i) Larger counters (*futokoro*),
 - (ii) Slanted or rotated to opposite directions,
 - (iii) Changed shapes slightly,
 - (iv) Replaced by another forms of the character.

3. Prototype of a Japanese typeface for dyslexic readers

- Modified from: Rounded M+ 2p
- Manipulation applied:
 - (a): by scripts
 - (b): by scripts
 - (c): by font selection
 - (f)(ii): by scripts
 - (f)(iii): manually
- Manipulation to be applied:
 - (d): by scripts or manually
 - (e): by scripts or manually
 - (f)(i): by scripts or manually
 - (f)(iv): manually

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