Arabic Script SHOULD NOT be so Scary!

What else Unicode still needs to do
for the Perso-Arabic script

Behnam Esfahbod
behnam.es
37th Internationalization and Unicode Conference – October 2013 – Santa Clara, CA

In the past decade...

The FarsiWeb Project

- National Standard for Persian Unicode text
- Standard Persian keyboard layouts on all major OSs
- Standard-based Open Source Persian TTF fonts
- Persian support in GNOME & Mozilla projects

IRNIC, The .IR ccTLD Registry

- Deploy Persian (second-level) IDNs
- Apply for the IDN ccTLD (actually, 2 of them!)

Persian Computing Community

- Over 300 engineers, designers,
- SIGs, e.g. Persian Typography

ICANN & IETF

- IDN Variant Issues Project
- MESWG Task Force on Arabic-Script IDNs

Previously on Unicode

Perso-Arabic Script

Mainly Arabic and Indo-Iranian languages

- Is the basis for many alphabets
- Persian, Urdu, Pashto, …, and Arabic!

No alphabet uses all kinds of shapes

- Four-dots is not used in Arabic or Persian
- But 99% of the shapes are recognized by everyone

Many writing styles

- Naskh, Nasta’liq, etc

Not all alphabets use all the features

- Arabic language/alphabet doesn’t use ZWNJ, traditionally
  Rooted in the language properties and its conjugation forms
- But recently is being used for non-Arabic words

IBM ⇒ آی‌بی‌ام

Semantic Encoding

Writing Direction

- Letters: right-to-left
- Digits: left-to-right

⇒ Unicode Bidirectional Algorithm (Bidi/UBA)

س ل ا م

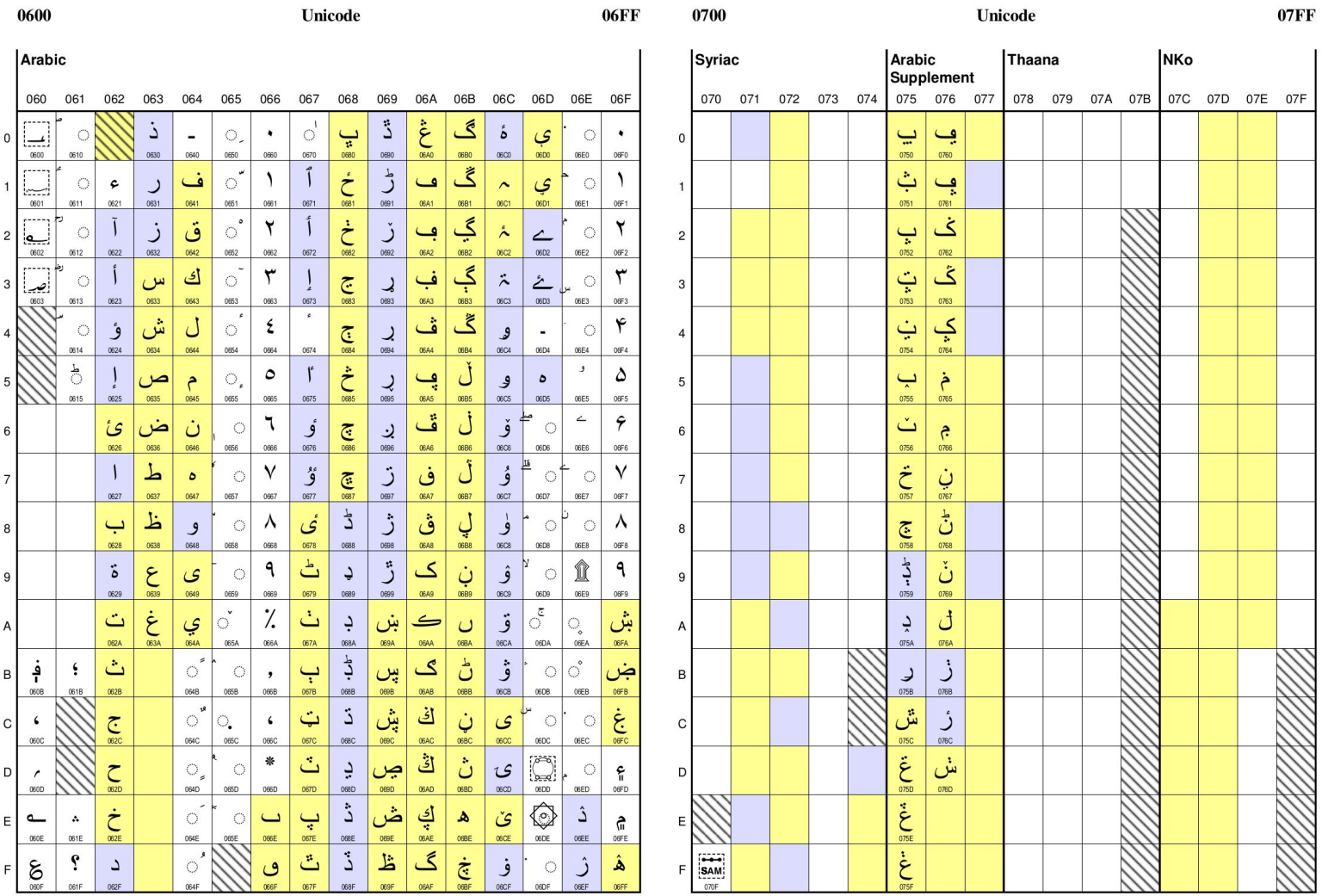
One code-point for each letter

⇒ Unicode Arabic Joining Algorithm

سلـام

سلام

- Joining Control Characters



Dual-Joining (yellow) & Right-Joining (blue)

Special Characters

1. U+0640 ARABIC TATWEEL
   - a.k.a. Kashida
   - کشیده ⇒ کشیـــــــــــــده
2. U+200C ZERO WIDTH NON-JOINER
   - a.k.a. ZWNJ
   - نامهای ⇒ نامه‌ای
3. U+200D ZERO WIDTH JOINER
   - a.k.a. ZWJ
   - ه.ش. ⇒ ه‍.ش.

Status Quo

1. Kashida
   - On the keyboard: too similar to Hyphen
   - Makes the text hard to process (search, …)
2. ZWNJ
   - Inaccessible in non-standard keyboard layouts
   - Confuses search engines and applications
   - IDNA2003
   - UTR #31 (Unicode Identifier and Pattern Syntax)
   - IDNA2008
   - UTR #36 (Unicode Security Considerations)
3. ZWJ
   - Too little use

     But when it’s needed, user is already tired of the other issues

Be Stylish

Typographic Styles

Western styles for Latin-like scripts

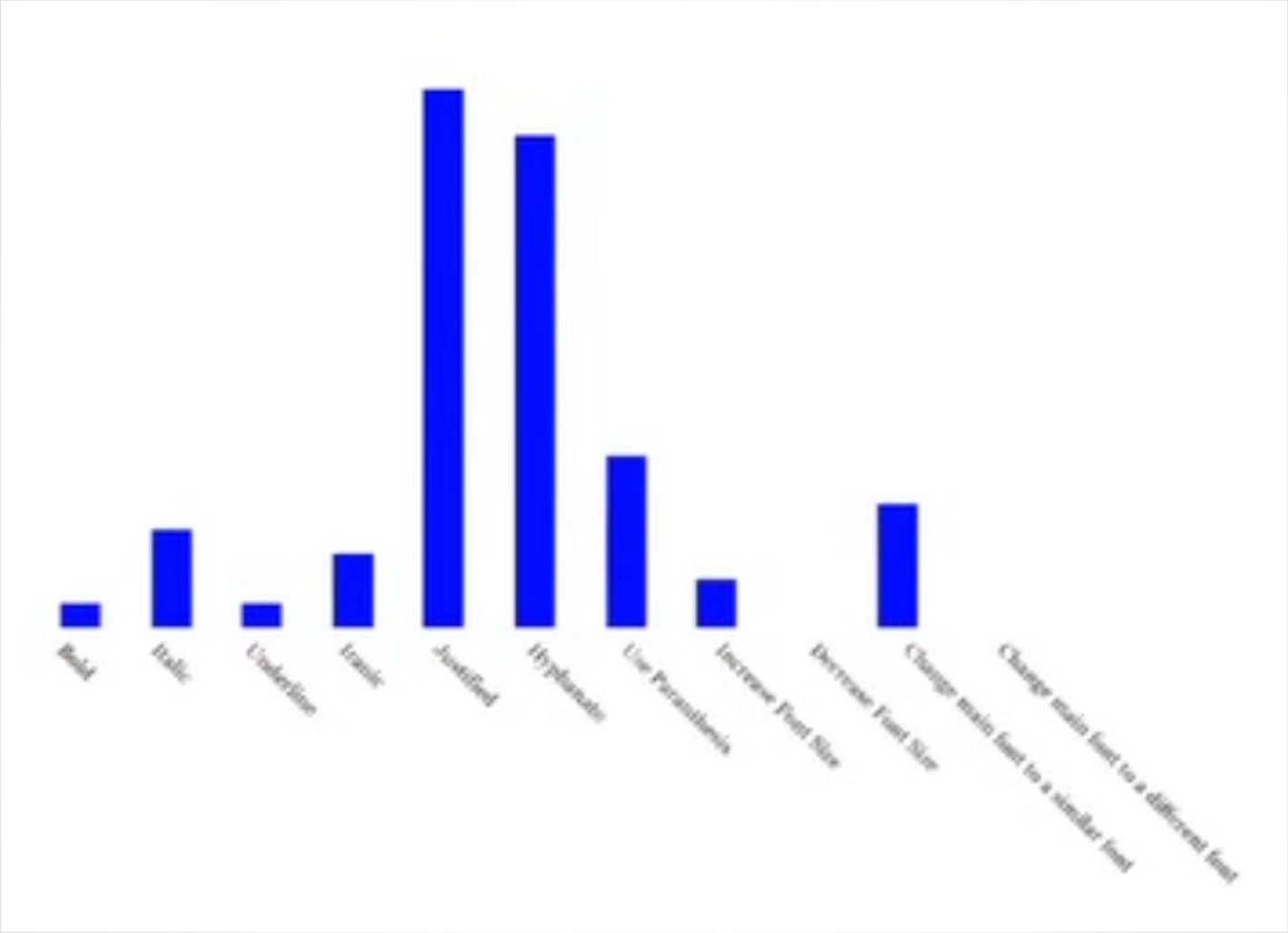
- Bold
- Italic & Slanted (including Iranic: left-slanted)
- Underline

Question:

When, how, and by whom these three became the de facto standard?

Justification & Elongation

- Traditionally used in manuscripts
- Used to be available in movable type too
- Recent study shows Elongation is still the right way to emphasize text in Perso-Arabic script



© 2013 Nasser Hadjloo, “Curious Case of Word Stylers”, TEDxTehran

1000 persons × 10 emphasis methods
⇒ Justification & Elongation lead the way!

Typographic Emphasis

Letter Spacing

L A T I N S C R I P T

Elongation + Word Spacing

خـــط فـــارســـی

- CSS
  - “letter-spacing” is useless (خ ط)
  - “text-justify” does work, only for justification

  ⇒ No sane way to do elongation

Verbal Emphasis

Letter Repetition

Latin script... Noooo!

Elongation

خط فارسی... بلـــــی!

- Keyboard
  - Direct mapping of characters to typographic elements (glyphs) is bad!
  - Press a Kashida key a few times to emphasize some letter, bad again!

Text Input & Storage

Joining Control

ZWNJ is very common in Persian

- Necessary to create compound words
- And mandatory for some words

خانه‌ای

بی‌بی

- But preferential in some others

خط‌کش

می‌شود

Larry Tesler: “no modes”

- Mode: a distinct setting in which the same user input will produce perceived different results than it would in other settings

Modeless Input Methods

Current keyboards techniques

- Based on the typewriter technologies
- Based on the needs of Latin script

Kashida insertion should be implicit

- Three key presses give you three letters
- Three letters need three key presses

[ب].....[ل]....[ه]

بـــــــــــــلـــــــه

ZWNJ insertion should be implicit

- Instead of “mode”, we need a “modifier”
- Shift key would make much sense!

Note: only applies to dual-joining letters, if followed by a joining letter

Obstacles

Input

- Need to remove unnecessary ZWNJ dynamically
- Hard to implement in keyboard engines
- Have to be implemented in an IME

Processing

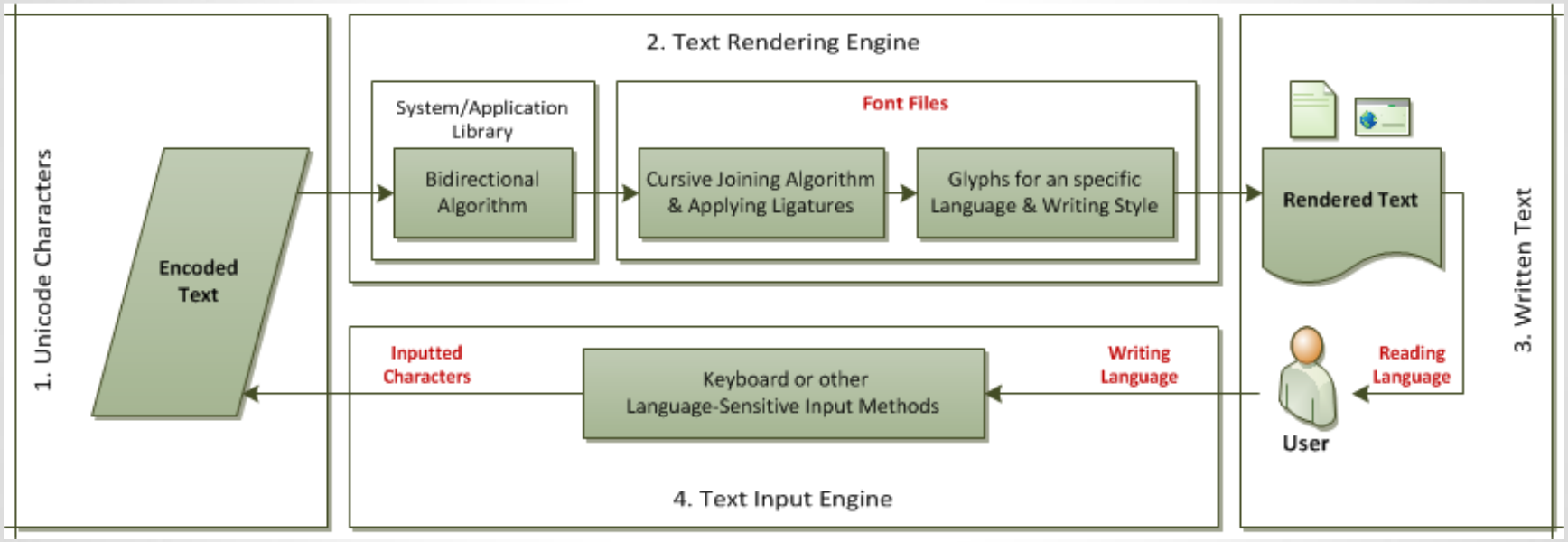
- Search
  - Kashida should be ignored
  - ZWNJ should be respected, sometimes
- Identifiers
  - Standards have to deal with them, individually!

Output

- A few apps still have problems with ZWNJ
- Kashida not handled correctly in most fonts

Multilingual Environments

HCI Model & Language



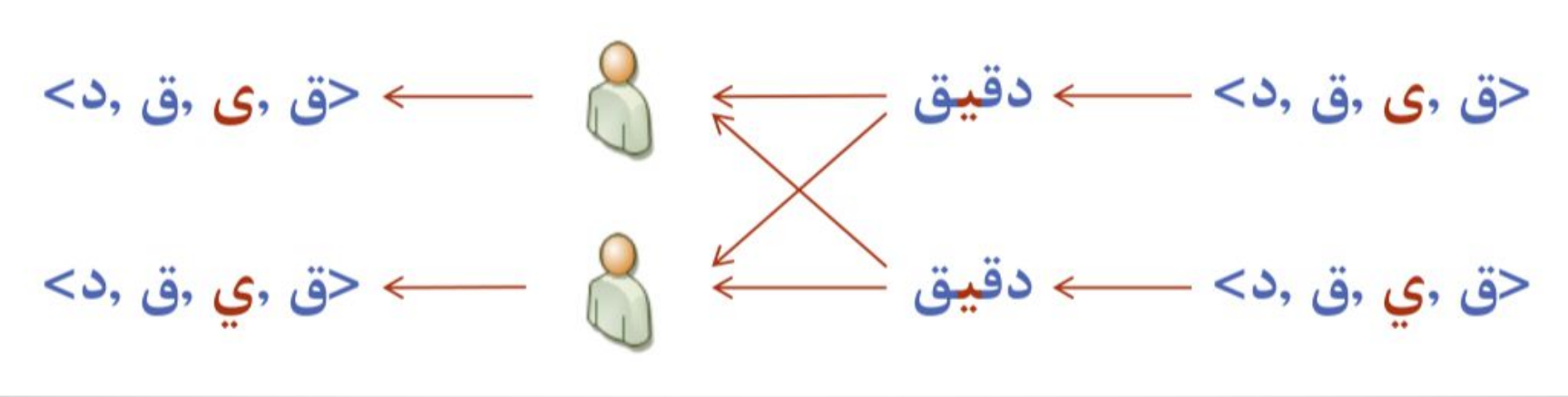
Language in the computer

Language in the user's mind

Encoding Challenges

Characters with similar shapes (Not in all joining forms)

Arabic Yeh vs. Persian Yeh



Typical default shapes for…		*Isolate*	*Final*	*Medial*	*Initial*
U+0647	ARABIC LETTER HEH	ه	ـه	ـهـ or ـه	هـ
U+06BE	… DOACHASHMEE	ھ	ـھ	ـھـ	ھـ
U+06C1	… GOAL	ہ	ـہ	ـہـ	ہـ
U+06FF	… WITH INVERTED SMALL V ABOVE	ۿ	ـۿ	ـۿـ	ۿـ
Urdu					
U+0647	ARABIC LETTER HEH	ہ	ـہ	ـہـ	ہـ
Sindhi					
U+0647	ARABIC LETTER HEH	ھ	ـھ or ـه	ـھـ or ـهـ	ھـ
Parkari					
U+0647	ARABIC LETTER HEH	ھ	ـھ	ـھـ	ھـ
Kurdish					
U+0647	ARABIC LETTER HEH	ھ	ـھ	ـهـ	ھـ

© SIL International

Prefered shapes of letter Heh family based on languages

Internationalized Identifiers

Confused about Kashida

- Use NFKC to get rid of it

Confused about ZWNJ

- Some protocols mandate some rules
  - And FAIL if the input doesn't comply
  - UTR #31 (Unicode Identifier and Pattern Syntax) rule 2.3.A1
  - UTR #46 ⇢ IDNA2008 ⇢ UTR #31
- No standard approach to make it more user-friendly
  - Although the semantics are obvious to the user

No harmony in same-shape problems

- Protocols barely talk about it
- Policy-making works only for a few cases
- Applications decide how to handle it, if they do

Developing a Solution

Existing Similar Methods

Case-Mapping

- Letter cases (different representation of the same concept)
- Useful for western scripts (Latin, Cyrillic, Greek, ...)
  - Doesn’t work for the other scripts
- Language-dependent

Normalization Form Canonical

- Deal with encoding issues
  - Ensure backward-compatibility
- Allow more expansion of UCD
  - Better forward-compatibility

Normalization Form Compatibility

- Works good for Arabic script (Kashida)
- But too much damage to other scripts

The Solution SHALL be able to...

- Remove unnecessary (invisible) ZWNJs
- Remove Kashida characters
- Place text into an specific language
  - Maintaining the expected shape
- Stay consistent when language is not specified

Arabic Shape Mapping

- Language-less Basic Normalization
  - Remove any unnecessary (invisible) ZWNJ
- Language-less Identifier Normalization
  - Basic normalization
  - Remove any Kashida
- Language-based Shape Mapping
  - Map characters with same joining-form shapes to the right one for the target language
- Language-less Shape Mapping
  - Not straightforward at all!

T H E E N D

پـــــــــــــــــــایان