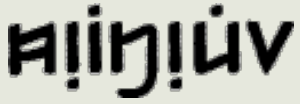
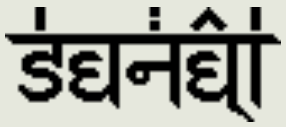
The Art and Science of Constructed Scripts

Jasper Danielson
Rice University





Images from Omniglot.com

Why create a constructed script?

Companion to a Conlang

- Adds depth to the language/world
- Can provide a social or historical feature
- Provides the public face of a conlang
- Can either enhance, or detract from, a conlang

Companion to a Conlang

- Tolkien's constructed scripts
  - Tengwar
  - Cirth
  - Sarati
  - Many others…

International Alphabets

- International Phonetic Alphabet (IPA)

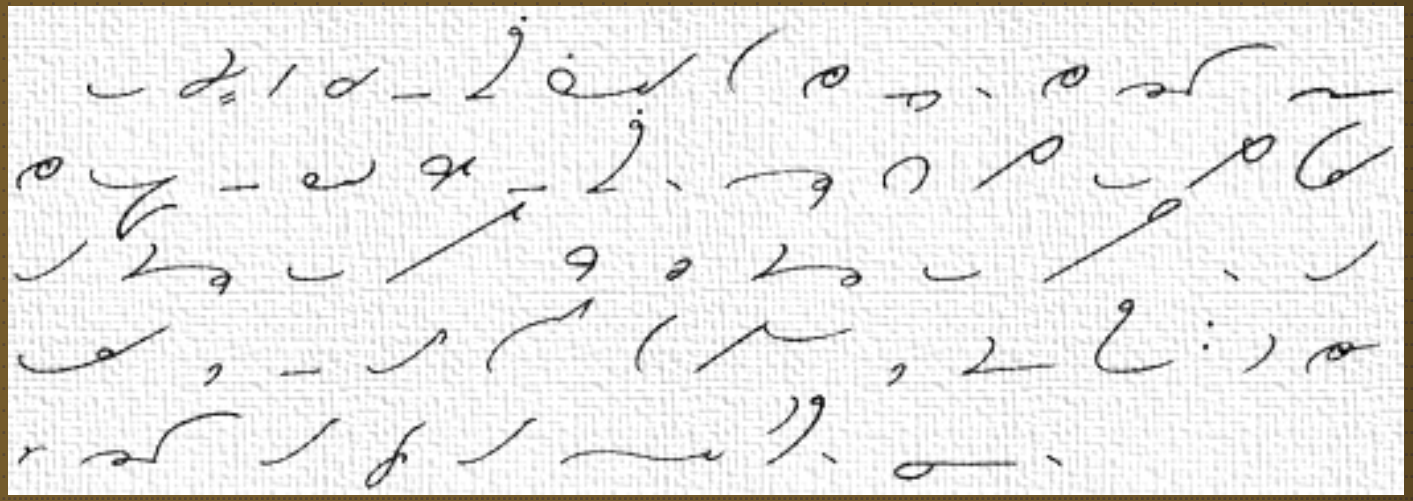
  ɪntəˈnæʃənəl

- Interbet

  Entəɬbət

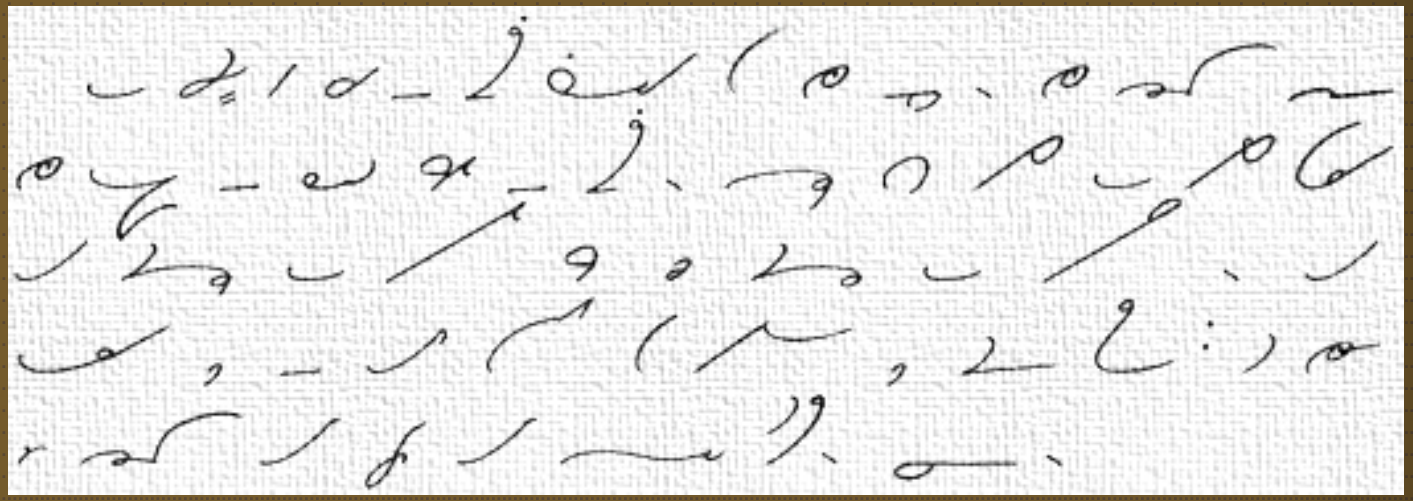
- Universal Phonetic Alphabet

Shorthand Scripts



Gregg Shorthand

Shorthand Scripts



Gregg Shorthand

Other optimization scripts

Non-Linguistic Uses

- Mathematical shorthand

$$0 < |x - x_0| < \delta \Longrightarrow |f(x) - L| < \varepsilon$$

- Musical notation

- Computer Programming

```
DO :1 <- #0¢#256
```

Educational Con-scripts

- A novel way to introduce the study of languages in the classroom
- Gets children excited about learning languages
- Recruiting!

The Neuroscience of Language

Audiovisual Pathways

- Connection between how we process:
  - Written language
  - Speech
  - Emotion
- Conlangers can play on this connection to create better scripts

Synesthesia

- Neurological disorder where phonemes/graphemes are associated with a sensory experience
- Grapheme/color
- Ordinal-Linguistic Personification

Synesthesia

"T's are generally crabbed, ungenerous creatures. U is a soulless sort of thing. 4 is honest, but… 3 I cannot trust… 9 is dark, a gentleman, tall and graceful, but politic under his suavity."

-Anonymous Synesthete

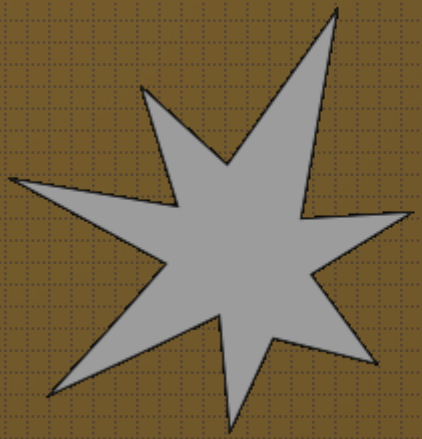
I am a synesthete!

(But so are all of you!)

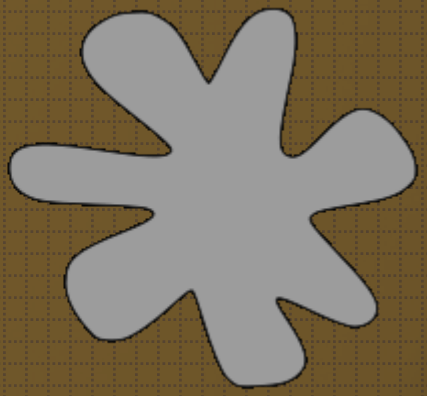
Kiki / Bouba Effect

- Based on classic 1929 psychology experiment
- 95%-98% agreement across subjects

Kiki



Bouba



Neuroscience of Language

- Language is complex
- Integration of many pathways:
  - Auditory
  - Visual
  - Vocal
  - Motor

Wernicke's Area

- Wernicke's Area is focal point of this language nexus
- Brain region responsible for "meaning" of language
- Integrates these different pathways

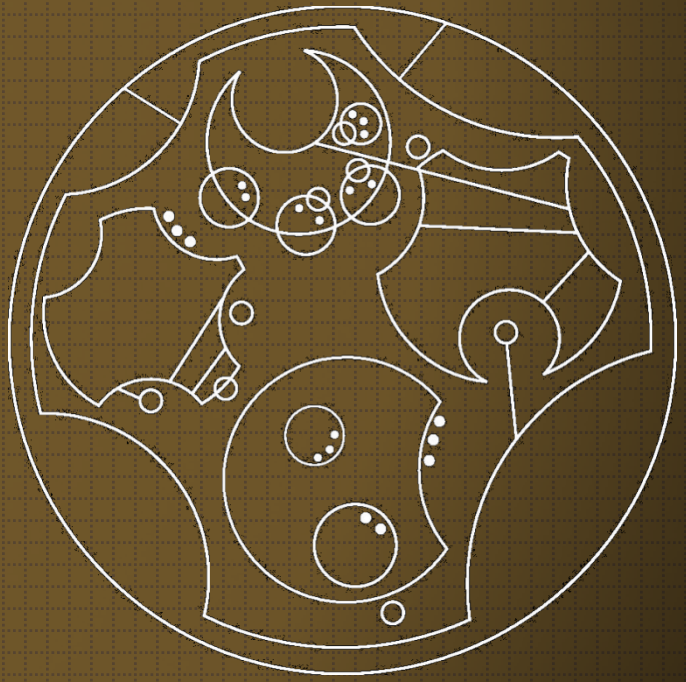
Wernicke's Area

- Causes cross-pathway echoing of different forms of language
- Reading & subvocalization
- Visual phenomena when speaking

So, what does this mean for constructed scripts?

- Spoken and written language are connected!
- Written features can accentuate certain features of spoken language
- Design a more natural-looking script for your conlang

- I will discuss a number of properties from the context of linear scripts
- Non-linear or otherwise innovative forms are possible
- Ex: Circular Gallifreyan

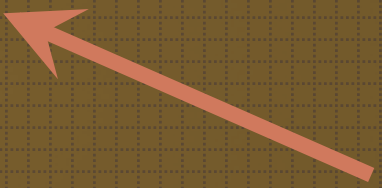


Script Features

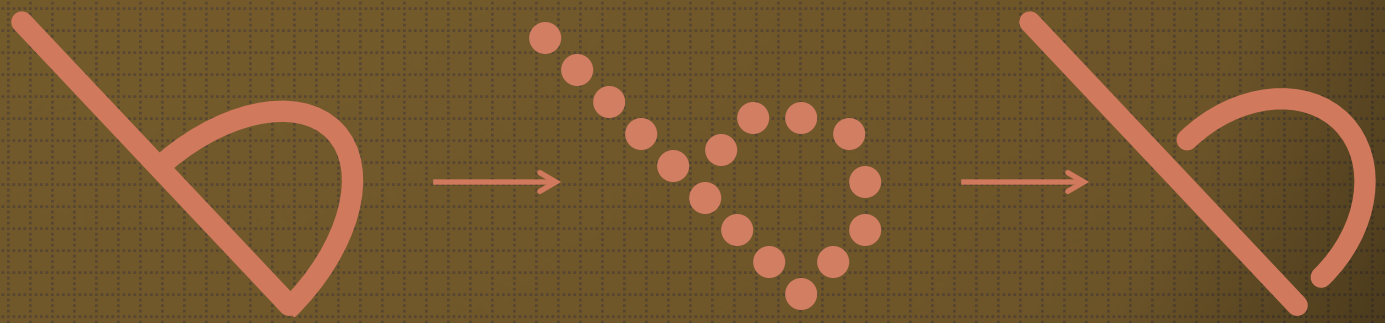
- Fundamental feature shapes
- Density and Alignment
- Breaks
- Structure
- Frequency
- Phonemic matching

Fundamental Feature Set

- Our perception of shapes is neurologically limited to a set of fundamental shapes:
  - Curve
  - Point
  - Dot
  - Line



These are the fundamental shapes



Lines

- Contributes to the perceived flow or lack thereof in a script
- Direction-sensitive
- Very quick visual processing
- Best paired with short/abrupt phonemes

Curves

- Circular Glass patterns take longer to process
- Concentrates eye movement
- One possible effect of a curve is "implied subvisualization"
- Best paired with longer sounds

Points

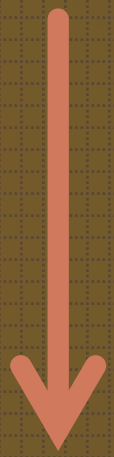
- (Or hyperbolic approximations)
- Depends on context
- When isolated, treated as a line
- When surrounded by other features, takes on their qualities
- “A” vs “m”

Dots

- Technically not a feature of its own
- Does not affect the perception of overall shape
- Creates “low-density” or “textured” lines

Intersections

- Compound shapes made from lines and curves
- L-intersection
- T-intersection
- X-intersection

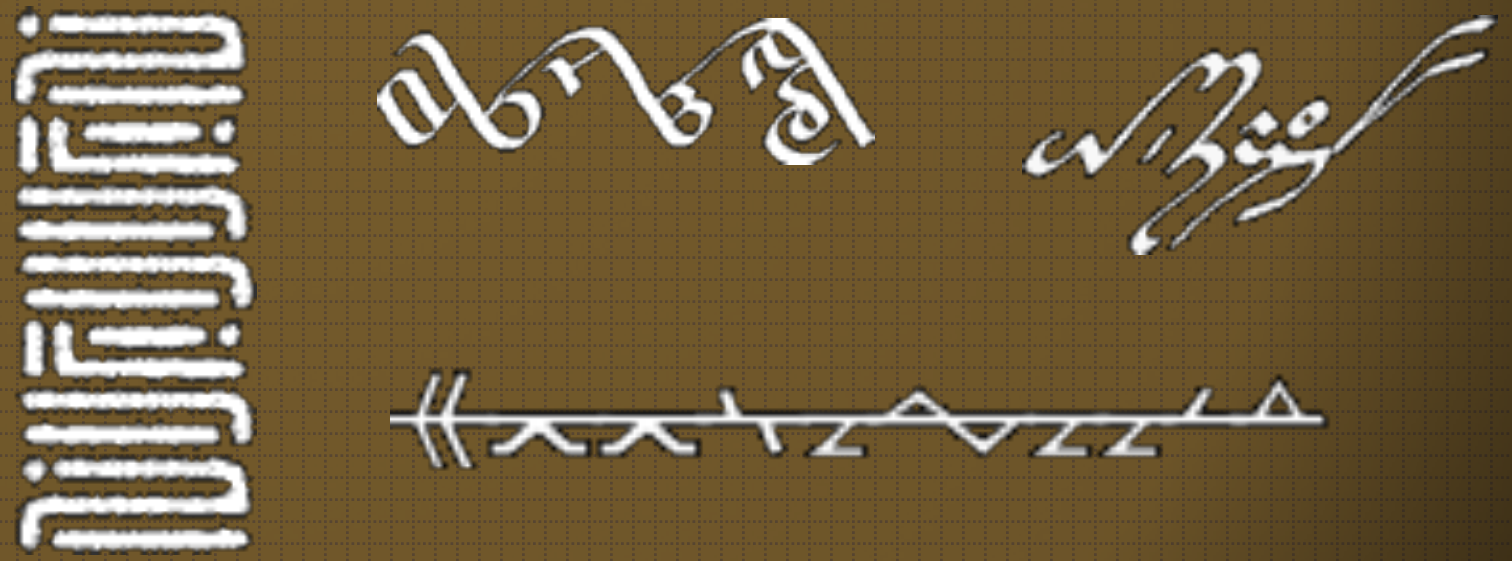


Increasing focal-time & emphasis

- Provides a focal point / emphasis for visual processing

Density & Alignment

- Eye movements follow script feature alignments
- Use to create a sense of movement (smooth or halting)
- Low feature density also contributes to flow

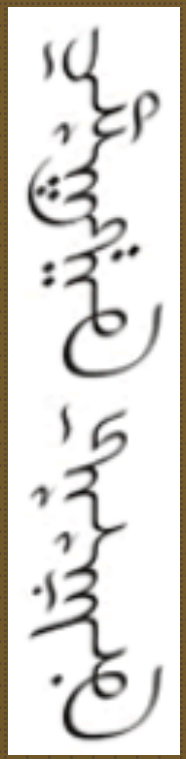


Breaks

- How frequently are breaks used in a script and what are they used for?
  - Word breaks
  - Line breaks
  - Sentence/clause breaks
  - Paragraph breaks
- Provide necessary mental divisions and pauses for a script
- Think creatively about punctuation!

Structural Features

- Recurrent shapes that frame the structure of a script
- When used, has enormous impact on script



A Rule of Thumb

About 80% of the impression of a conscript comes from the 20% most frequently used characters

So choose wisely!

Featural Matching

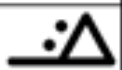
- One common trend in conscripts is to match similar phonemes with similar structural elements
- Example: “b” & “p”
- However, languages with lots of inflection or nuance should potentially avoid this

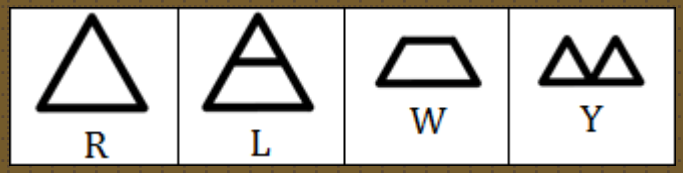
Other Features

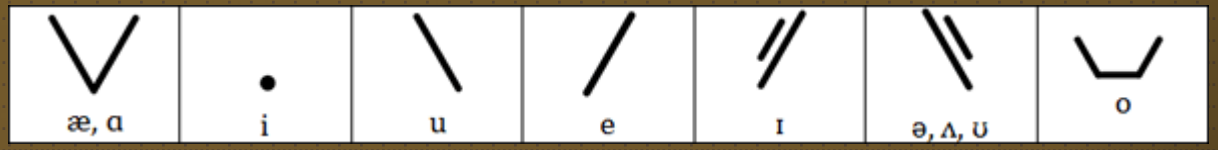
- Writing system (alphabet, abjad, abugida…)
- Direction of writing

The Ryonic Script Family

Ryonic Blades

	Bilabial & Labiodental		Interdental		Palatal		Alveopalatal		Velar & Glottal	
Fricatives	F	V	TH [θ]	DH [ð]	S	Z	SH [ʃ]	ZH [ʒ]	H	
Stops & Affricates	P	B			T	D	TCH [ʧ]	DZH [ʤ]	K	G
Nasals		M				N				 NG [ŋ]

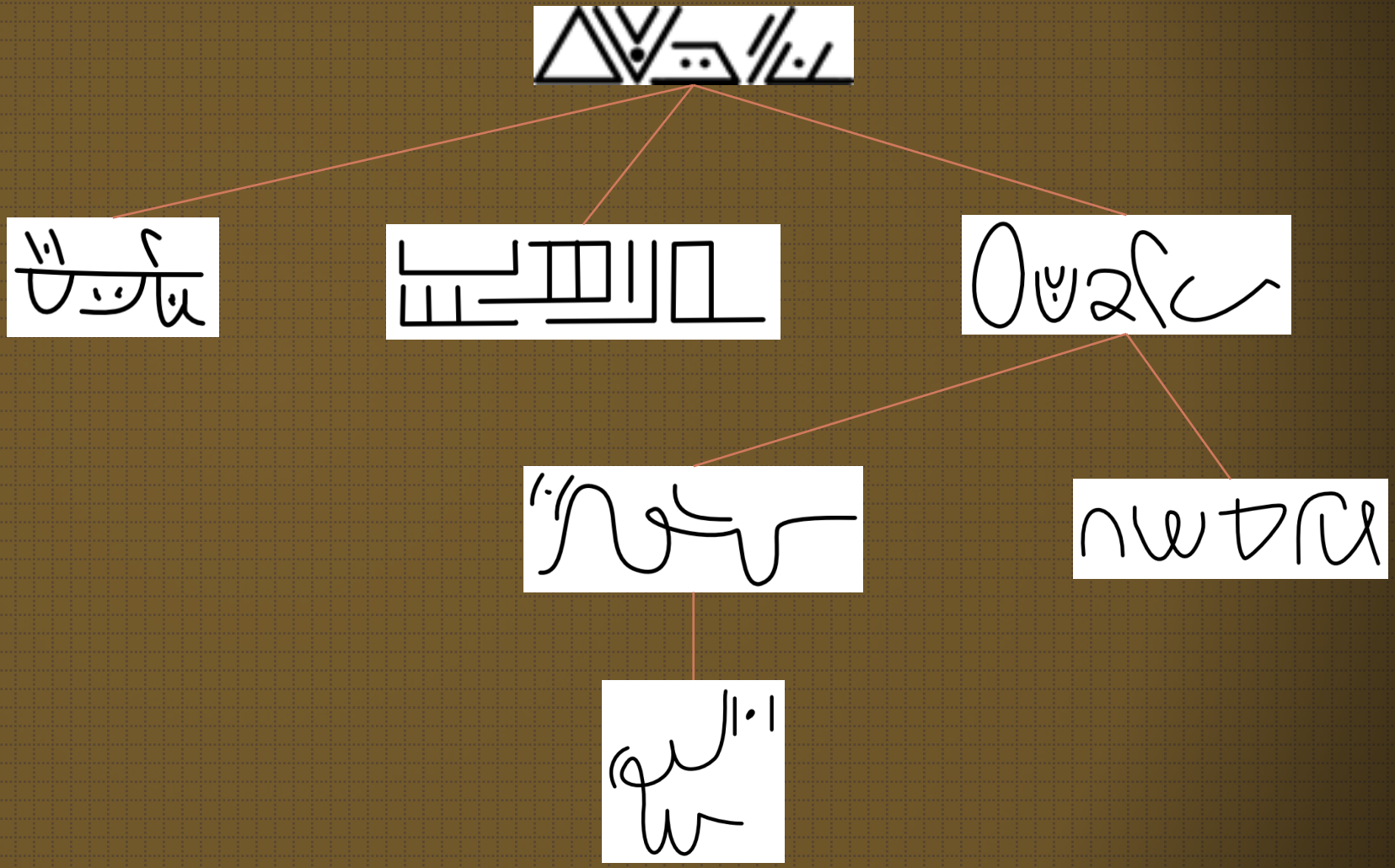




Images from Omniglot.com

Images from Omniglot.com

Ryonic Family Tree



Non-Linguistic Scripts

- Many cultures have specialized scripts or symbols for non-linguistic tasks, such as:
  - Mathematics
  - Music
  - Chemistry
  - Many others…

Mathematical Script

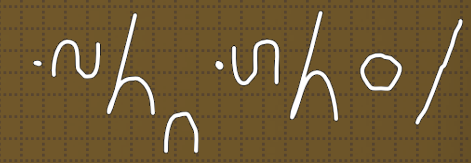
- I suppose you could call this con-math…

$\sin^2\theta + \cos^2\theta = 1$

Mathematical Script

- I suppose you could call this con-math…

$\sin^2\theta + \cos^2\theta = 1$



Questions?