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Systematic chaos or chaotic systems?
Some ponderings on the complexity of the
Japanese writing system

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Overview

- Opening remarks

- Multiple scripts as a chaotic factor?

- Dual-readings of kanji as a chaotic factor?

- Compound morphology as a systematic factor?

- Closing remarks

Opening remarks 1

Undeniably, Japanese writing system (JWS) has a unique reputation in terms of its complexity (Joyce, 2002; 2011).

Coulmas (1989: 122): … Chinese characters were transformed to become what is often said to be the most intricate and complicated writing system ever used by a sizable population.

DeFrancis (1989: 138): [the Japanese people] … ended up with one of the worst overall systems of writing ever created.

Fischer (2001: 167): [claims JWS's multiple scripts that are] written together following arbitrary rules perhaps embody the most complicated form of writing ever devised.

Gnanadesikan (2009: 113): [similarly] The resulting syncretism of three scripts used simultaneously qualifies as the most complex writing system in modern use.

Opening remarks 2

Sproat (2010: 47): Japanese is a complex system, certainly the most complex writing system in use today and a contender for the title of the most complex system ever.

And yet, adopting a different perspective on the script mixture,

Backhouse (1984: 220): [remarks how it] makes for a potential flexibility of orthography on a scale that is inconceivable in the case of more familiar writing systems.

Indeed, as literacy rates are generally high in Japan, despite the perceived complexity of JWS, perhaps some changes in perspective might be warranted.

As Yamada (1967: 705) observes, research on JWS may yield significant insights for both understanding writing systems and for thinking about writing and reading more generally.

Opening remarks 3

So, returning to our title question, is it more apt to regard JWS as being an example of *systematic chaos* or *chaotic systems*? Perhaps only marginal difference; just a trivial matter of degree?

Given unsustainability of chaos – not matter how systematically organized – while not without inconsistencies, ultimately, best to regard JWS, like many human artifacts, as **chaotic system**, which, beyond affording mere functionality, also fosters considerable degrees of graphematic innovation and creativity.

Moreover, as compound morphology section seeks to convey, two-kanji compound words (2KCWs) function as core building blocks for a considerable proportion of the Japanese lexicon. Compound words (CWs) are generally semantically transparent; a considerable boon for extracting meaning, which is, of course, the primary goal of reading!

Overview

Multiple scripts as a chaotic factor? 1

Standard convention of graphematic representation is known as 漢字仮名交じり文 kan-ji-ka-na-ma.jiri.bun* *mixed kanji and kana writing* [kanji + kana + mixed + writing].

* Glosses without slashes; - for kanji-kanji boundary; . for kanji-kana boundary

The multiple scripts are morphographic 漢字 kan-ji *kanji* (lit. 'Chinese characters'), two syllabographic scripts of 平仮名 hira-ga-na *hiragana* and 片仮名 kata-ka-na *katakana*, phonemic ローマ字 rōma.ji *Latin letters*.

Multiple scripts are generally employed together in largely separate and complementary ways, serving to differentiate between content and grammatical words and, to lesser degree, between lexical strata.

However, the co-existence of multiple scripts also means that graphematic variation is a pervasive characteristic of JWS (Joyce & Masuda, 2019).

Multiple scripts 2: Morphographic kanji 1

Dominant component script by type counts.

Estimated 10,000+ in common use by end of Tokugawa era (1603-1868) (Twine 1991), but since mid-C20, government issuing guidelines aimed at limitations (plus some simplification).

'Kanji for general use' guidelines	Date	Kanji
当用漢字表 tō-yō-kan-ji-hyō	1946	1,850
常用漢字表 jō-yō-kan-ji-hyō	1981 Oct	1,945
Jōyō kanji list revision [-5 +196 = 191]	2010 Nov	2,136
教育漢字 kyō-iku-kan-ji *education kanji* for Grades 1-6		(1,006)
Remainder taught during high school		(1,130)

Generally conformed to in official documents and newspapers, although certainly not prescriptive for all written Japanese.

Stronger upper limit on numbers is JIS X 0208 character set, which specifies 6,355 kanji (level 1, 2,965; level 2, 3,390).

Multiple scripts 3: Morphographic kanji 2

Joyce, Hodošček, & Nishina (2012) report coverage ratios for word lists extracted Balanced Corpus of Contemporary Written Japanese (BCCWJ; Maekawa, et al 2011).

Jōyō:	(2,136)	types:	33.03%	tokens:	96.12%
JIS X 0208:	(4,093)	types:	63.30%	tokens:	3.60%

Kanji represent both native-Japanese (NJ) and Sino-Japanese (SJ) content words, including nouns (n), stems of verbs (v) and of some adjectives (adj), and some adverbs (adv).

水	mizu	*water* [NJ-n]
防ぐ	fuse.gu	*defend against, protect against* [NJ-v]
古い	furu.i	*old; ancient; antique* [NJ-adj]
予め	arakaji.me	*in advance* [NJ-adv]

[Deferring SJ examples to later section on compound morphology]

Multiple scripts 4: Syllabographic kana 1

Evolved separately, but both hiragana and katakana can represent all syllables (mora) of contemporary Japanese
46 basic characters [48 with 2 historical forms (gray)]

Hiragana

	A	I	U	E	O
	あ	い	う	え	お
K-	か	き	く	け	こ
S-	さ	し	す	せ	そ
T-	た	ち	つ	て	と
N-	な	に	ぬ	ね	の
H-	は	ひ	ふ	へ	ほ
M-	ま	み	む	め	も
Y-	や		ゆ		よ
R-	ら	り	る	れ	ろ
W-	わ	ゐ		ゑ	を
N	ん				

Katakana

	A	I	U	E	O
	ア	イ	ウ	エ	オ
K-	カ	キ	ク	ケ	コ
S-	サ	シ	ス	セ	ソ
T-	タ	チ	ツ	テ	ト
N-	ナ	ニ	ヌ	ネ	ノ
H-	ハ	ヒ	フ	ヘ	ホ
M-	マ	ミ	ム	メ	モ
Y-	ヤ		ユ		ヨ
R-	ラ	リ	ル	レ	ロ
W-	ワ	ヰ		ヱ	ヲ
N	ン				

Multiple scripts 5: Syllabographic kana 2

Also, same systematic extensions for voicing + combinations

Hiragana

	A	I	U	E	O
G-	が	ぎ	ぐ	げ	ご
Z-	ざ	じ	ず	ぜ	ぞ
D-	だ	ぢ	づ	で	ど
B-	ば	び	ぶ	べ	ぼ
P-	ぱ	ぴ	ぷ	ぺ	ぽ

	ya	yu	yo
K-	きゃ	きゅ	きょ
S-	しゃ	しゅ	しょ
T-	ちゃ	ちゅ	ちょ
N-	にゃ	にゅ	にょ
H-	ひゃ	ひゅ	ひょ
M-	みゃ	みゅ	みょ
R-	りゃ	りゅ	りょ

Katakana

	A	I	U	E	O
G-	ガ	ギ	グ	ゲ	ゴ
Z-	ザ	ジ	ズ	ゼ	ゾ
D-	ダ	ヂ	ヅ	デ	ド
B-	バ	ビ	ブ	ベ	ボ
P-	パ	ピ	プ	ペ	ポ

	ya	yu	yo
K-	キャ	キュ	キョ
S-	シャ	シュ	ショ
T-	チャ	チュ	チョ
N-	ニャ	ニュ	ニョ
H-	ヒャ	ヒュ	ヒョ
M-	ミャ	ミュ	ミョ
R-	リャ	リュ	リョ

Multiple scripts 6: Syllabographic kana 3

Hiragana represent functional words (e.g., copula verb), inflectional elements of verbs, some adjective, grammatical case markers (particles) and conjunctions.

です	desu	*copula verb* [functional]
の	no	*possessive marker* [particle]
しかし	shikashi	*however* [conjunction]

Katakana represent foreign-Japanese (FJ) (but not Chinese words), foreign names, species names, onomatopoeia, emphasis and as glosses.

スマートフォン	sumātofon	*smart phone* [FJ]
ミルク	miruku	*milk* [FJ]
チカチカ	chikachika	*flickering, twinkling* [onomatopoeia]

Multiple scripts 7: Rōmaji

Basic set of 26 letters used for English, supplemented with macrons (Āā Ēē Īī Ōō Ūū) for long vowels, is sufficient.

But, target pronunciation often not clear due to both multiple romanization conventions and different source languages.

富士山
Mount Fuji

fujisan	Hebonshiki [used by Hepburn]
hudisan	Nihonshiki [least common]
huzisan	Kunreishiki [Cabinet (1954)]

Rōmaji represent foreign words and names, particularly in advertising and mass media.

PC	pīshī	*personal computer* [FJ]
CM	shīemu	*TV commercial, ad* [NJ]

Multiple scripts 8: Script proportions

Script proportions reflect a variety of sociolinguistic factors. Igarashi (2007) analyzed for word lists extracted from 3 newspapers, 9 magazines, and corpus of TV commercials.

Script type	All	Newspapers	TV commercials
Kanji	60.72%	72.33%	51.38%
Hiragana	20.51%	18.24%	20.51%
Katakana	12.69%	5.73%	17.35%
Alphabetic + numbers	6.09%	3.81%	10.80%

As summary table indicates, greatest differences between newspapers and commercials in terms of kanji percentages, with magazines falling in between, but, also much variation across the range of magazines.

Multiple scripts 9: Graphematic variation 1

Consistent with Backhouse's (1984) remark about flexibility, graphematic variation is indeed a ubiquitous characteristic, as Joyce, Hodošček & Nishina (2012) have illustrated with their corpus-based (BCCWJ) examples.

Most frequent 100 short-unit words (SUW) + 100 long-unit

Word class	SUW means	SUW ranges	LUW means	LUW ranges
Nouns	7.13	1-34	6.62	1-16
Verbs	10.19	2-28	6.64	1-21
i-adjectives	9.96	2-24	5.30	2-28
adverbs	6.46	2-29	4.64	2-13
Mean	**8.44**		**5.80**	

Variant ratios for 玉葱 tama-negi *onions* [NJ-n]:
玉ねぎ (.49), タマネギ (.21), たまねぎ (.17), 玉葱 (.08), 玉ネギ (.05)

Multiple scripts 10: Graphematic variation 2

Joyce & Masuda (2019) propose tentative framework for various influencing factors of conventionality and intentionality.

1 Message context: Medium; Audience; Genre

2 Script sensibilities: Kanji avoidance; Nuance differentiation; Author stylistics; Script associations

3 Creative representation: Word play; Playful rubi; graphic play

Script association example

私, わたし, ワタシ, watashi

watashi *I* [1st-person pronoun]

More commonly for females; either as kanji or hiragana, but katakana here challenging gender conventions

watashi wa yowanai *I don't get drunk*

[Fall 2017 ad campaign for Choya's nonalcoholic ウメッシュ Umesshu *ume liqueur*: http://www.choya.co.jp/]

Examples of graphematic variation and graphic play:

Graphematic variants:
Both kanji + hiragana,
and rōmaji replication

Graphic play 1:
Image + mixed (kanji-rōmaji) representations

Graphic play 2:
Image+kanji combined

✈ ＋ 旅 tabi *travel*

Overview

Dual-readings as a chaotic factor? 1

Dual-readings are direct consequence of how Chinese characters adapted to writing Japanese (prior to C7CE).

訓読 kun-doku *reading by gloss* or **meaning-mapping** method was core aspect of adaption approach (Lurie, 2012).

Basically, associated Chinese characters with Japanese words plus rearranged ordering according to Japanese syntax.

Initially, practice to read Chinese texts, but, in reverse, became a way of implementing written Japanese.

音読 on-doku *reading by sound* also continued, such that kanji because associated with both 訓読み kun-yo.mi *NJ* and 音読み on-yo.mi *SJ pronunciations* or morphemes.

For example, 人 *person* associated with both NJ morpheme hito (fitö) and SJ morpheme JIN*, especially due to considerable influx of Chinese loanwords by C8CE.

* Hereafter, SJ morphemes indicated with small-caps convention

Dual-readings 2: Intriguing form of allography

Supplementing earlier NJ examples for fuller picture of dual-
 readings which underlies intriguing form of allography for JWS

NJ-morpheme		Meaning	SJ-morpheme	
水	mizu	*water*	水	SUI
防ぐ	fuse.gu	*defend/ protect against*	防	BŌ
古い	furu.i	*old; ancient; antique*	古	KO
予め	arakaji.me	*in advance*	予	YO

Moreover, SJ-morphemes are predominately bound elements of
 compound words, such as in;

防水   BŌ-SUI   *waterproofing* [protect against + water]

予防   YO-BŌ   *prevention; precaution* [in advance + protect against]

Dual-readings 3: Multiple kun-on pronunciations 1

Frequency distributions of onyomi and kunyomi for jōyō kanji
(Table 2 from Joyce, Masuda, & Ogawa, 2014: 180)

Kunyomi per kanji	Onyomi per kanji						Total
	0	1	2	3	4	5	
0	0	741	78	2	0	0	821
1	66	685	93	7	0	0	851
2	9	238	55	5	0	1	308
3	1	77	15	2	0	0	95
4	0	35	10	1	0	0	46
5	0	7	0	0	0	0	7
6	0	1	0	0	0	0	1
7	0	3	0	0	0	0	3
8	0	0	1	0	0	0	1
9	0	0	1	0	0	0	1
10	0	0	2	0	0	0	2
Total	76	1,787	255	17	0	1	2,136

Dual-readings 4: Multiple kun-on pronunciations 2

	SJ	NJ	meaning
決	KETSU	決まる ki.maru; 決める ki.meru	*decide* (vi) *decide* (vt)
新	SHIN	新しい atara.shii 新た ara.ta 新妻 nii.zuma (bound)	*new; novel, fresh* *new; novel, fresh* *new wife* [new + wife]
下	KA GE	下 shita 下 shimo 下 moto 下がる sa.garu; 下げる sa.geru 下る kuda.ru; 下す kuda.su 下さる kuda.saru 下す o.rosu; 下りる o.riru	*below; bottom* *lower reaches; lower part* *under; beneath* *go down* (vi); *hang* (vt) *descend* (vi); *lower* (vt) *give; confer; bestow* *take down* (vt); *go down* (vi)

Overview

- Opening remarks

- Multiple scripts as a chaotic factor?

- Dual-readings of kanji as a chaotic factor?

- **Compound morphology as a systematic factor?**

- Closing remarks

Compound morphology as a systematic factor? 1

As the principal component of multiple-script JWS, kanji function as core building blocks for the graphematic representation of a considerable proportion of Japanese lexicon (Joyce & Masuda, 2018, 2019; Joyce, Masuda, & Ogawa, 2014).

Deeply entwined with their morphographic nature (Joyce, 2011),

Kobayashi, Yamashita & Kageyama (2016: 129): [stress] kanji play an important role in providing the readers of written Japanese with a visual aid for capturing the meaning of a word at a glance (p. 129)

However, the significance of JWS as evidence for semantically-mediated path of visual word recognition (whether perceived of in terms of dual-route model (Coltheart et al, 2001) or triangle model (Seidenberg & McClelland, 1989) has, arguable, yet to fully receive the attention that it deserves for developing models of reading.

Compound morphology 2: Ongoing analyses of structures

Section draws primarily on ongoing analyses of morphological structures of compound words and related studies examining their psychological realities.

Two-kanji compound words (2KCWs): Largely following Nomura's (1988) influential classification according to 9 word structures (Joyce, 2002; Masuda & Joyce 2005).

Three-kanji compound words (3KCWs): Analyzing structures of 23,046 most frequent lemmas from Joyce, Hodošček & Nishina's (2012) corpus-word lists (Masuda & Joyce, 2019; Joyce & Masuda, 2021).

Four-kanji compound words (4KCWs): Analyzing structures of 23,159 most frequent lemmas (Joyce & Masuda, 2020; 2021).

The results for the 3KCWs + 4KCWs in terms of components, denoted as A~D with [] indicating internal structures

Compound morphology 3: 2KCW principal structures 1

Modifier + modified [n+n; adj+n; v+n]

海水	KAI-SUI	*sea water* [sea + water]
新車	SHIN-SHA	new car [new + vehicle; wheels]
防具	BŌ-GU	*armor, protector* [protect against + tool; means]

Verb + complement [invariably v+n, where n is object]

防水	BŌ-SUI	*waterproofing* [protect against + water]
消火	SHŌ-KA	*fire fighting* [extinguish + fire]
預金	YO-KIN	*deposit (money)* [deposit; entrust + gold; money]

Complement + verb [wider range of complements]

予防	YO-BŌ	*prevention; precaution* [in advance + protect against]
猛攻	MŌ-KŌ	*fierce attack* [fierce; rave + attack]
外食	GAI-SHOKU	*dining out* [outside + eat]

Compound morphology 4: 2KCW principal structures 2

Associative pairs [typically antonyms or exemplars]

攻防   KŌ-BŌ   *offense* + *defense* [attack + defend against]

増減   ZŌ-GEN   *increase* + *decrease; flux* [increase + decrease]

湖沼   KO-SHŌ   *wetland; inland waters* [lake + marsh]

Synonymous pairs [involving noun-pairs and verb-pairs]

防護   BŌ-GO   *protection* [safeguard + protect against]

達成   TAS-SEI   *achievement; attainment* [attain + become]

山岳   SAN-GAKU   *mountains* [mountain + mountain; peak]

Remaining 4 principles are relatively less frequent.

Repetitions [second element replaced with *ditto* character]

段々   DAN-DAN   *gradually; by degrees* [level + level; step + step]

個々   KO-KO   *individual; one by one* [individual + individual]

Compound morphology 5: 2KCW principal structures 3

Derivations [involving both affixes and suffixes]

不明   FU-MEI   *unclear; obscure; indistinct* [un- + clear]

史的   SHI-TEKI   *historic; historical* [history + adjective-suffix]

Abbreviations [forms of clipping from longer compound words]

外大   GAI-DAI   *university of foreign studies* [outside + big; uni.]
[from 外国語大学 university of foreign language studies]

農協   NŌ-GYŌ   *agricultural cooperative* [agriculture + cooperation]
[from 農業協同組合 agricultural cooperative]

Phonetic borrowings [* exceptions to morphographic principle as both are phonographic and rebus-based]

阿片   A-HEN   *opium* [当て字 a.te.ji *phonetic transcription*]

葡萄   BUDŌ   *grapes* [熟字訓 JUKU-JI-KUN *monomorphemic*]

Compound morphology 6: 3KCW analysis summary

Structure	Type counts	%
[AB]+C	17,761	77.1
A+[BC]	4,904	21.3
[AC*]+[BC] (*C of [AC] omitted)	154	0.7
[AB]+[A*C] (*A of [AC] omitted)	15	0.1
A+B+C	25	0.1
Non-divisible	93	0.4
Monomorphemic (熟字訓)	45	0.2
Phonological transcription (当て字)	64	0.3
Multiple types (Count adjustment)	-15	-0.1
Total	**23,046**	**100**

Dominant [AB]+C pattern (77.1%) and A+[BC] pattern (21.3%) both involve 2KCWs with an additional morpheme appended, underscoring the significance of 2KCWs (Joyce, 2011; Nomura, 1988).

Compound morphology 7: 3KCW principal structures 1

[AB]+C [C-components typically generic nouns and suffixes]

NB: Morphology structures not indicated for previous analyzed CWs

防水布   BŌ-SUI-FU   *waterproof cloth* [[waterproof] + cloth]

防水性   BŌ-SUI-SEI   *waterproofed* [[waterproof] + nature]

海水魚   KAI-SUI-GYO   *saltwater fish* [[sea-water] + fish]

消防車   SHŌ-BŌ-SHA   *fire engine*
[[extinguish + protect = fire fighting] + vehicle; wheels]

予防的   YO-BŌ-TEKI   *preventive* [[prevention] + adjectival suffix]

A+[BC] [A-components typically nouns, adjectives and affixes]

癌予防   GAN-YO-BŌ   *cancer prevention* [cancer + [prevention]]

新大陸   SHIN-TAI-RIKU   *New World (esp. Americas)*
[new + [large + land = continent]]

全人類   ZEN-JIN-RUI   *All humanity* [all + [person + kind = humanity]]

Compound morphology 8: 4KCW analysis summary

Structure	Type counts	%
[AB]+[CD]	19,805	85.3
[ABC]+D	2,809	12.1
A+[BCD]	449	1.9
Non-divisible	23	0.1
[ACD*]+[BCD] (*CD of [ACD] omitted)	18	0.1
[AD*]+[BD*]+[CD] (*D of [AD] + [BD] omitted)	16	0.1
A+B+C+D	16	0.1
Phonological transcription (当て字)	14	0.1
[AB]+C+D	6	0.0
Monomorphemic (熟字訓)	2	0.0
[AD*]+[BCD] (*D of [AD] omitted)	1	0.0
Total	**23,159**	**100**

Dominant [AB]+[CD] structure, 85.3%, is followed by [ABC]+D pattern (12.1%) and by A+[BCD] (1.9%).

[AB]+[CD] [Combinations of 2KCWs]

防水加工　BŌ-SUI-KA-KŌ　　*waterproof finish*

[[waterproof] + [add + craft = finish]]

予防医学　YO-BŌ-I-GAKU　　*preventative medicine*

[[prevention] + [medicine + study = medicine]]

自殺予防　JI-SATSU-YO-BŌ　　*suicide prevention*

[[self + kill = suicide] + [prevention]]

新車販売　SHIN-SHA-HAN-BAI　　*new car sales*

[[new car] + [marketing; trade + sell = sales]]

Compound morphology 10: 4KCW principal structures 2

[ABC]+[D] [3KCWs with additional D-component]

新生児室　SHIN-SEI-JI-SHITSU　*neonatal ward*

[[new + born] + child] + room]

外国人達　GAI-KOKU-JIN-TACHI　*foreigners*

[[[outside + country] + person] + pluralizer]

強酸性水　KYŌ-SAN-SEI-SUI　*hypochlorous acid water*

[[[strong + acid] + nature]] + water]

A+[BCD] [3KCWs with additional A-component]

非農林業　HI-NŌ-RIN-GYŌ　*non-agricultural and forestry*

[non + [[agricultural + forest] + business]]]

市消防団　SHI-SHŌ-BŌ-DAN　*city fire brigade*

[city + [[fire fighting] + group; association]]

Compound morphology 11: Inferring CW meanings 1

Presented CWs underscore the morphographic nature of kanji. Naturally, not all are so semantically transparent (reflecting factors such as semantic shifts), but, overall, compound morphology is pretty systematic; something that descriptions of writing systems should capture their dominant principles.

In contrast these corpus-attested examples and structural patterns, conclude section with brief outline of Hatano, Kuhara, & Akiyama (1981) (see also Hatano 1995 for fuller description).

As brief prelude, however, please consider the following CWs:

海水   KAI-SUI   *sea water* [sea + water]

水族館   SUI-ZOKU-KAN   *aquarium*

              [[water + tribe; family] + large building]

水力発電   SUI-RYOKU-HATSU-DEN   *hydroelectric power generation*

             [[water + power] + [emit + electricity]]

Hatano et al (1981) conducted a matching study for various technical terms + their definitions

piscivorous	eating fish as a regular diet
heliotropic	phototropism in which sunlight is the orienting stimulus
limnology	scientific study of physical, chemical, and biological conditions in lakes and ponds

魚食性	魚を常食とすること
向日性	植物体の一部が光の強い方えへ向って屈曲する性質
湖沼学	湖沼の成因、形状、水温、水質、科学、成分、生物、利用法などを研究する学問

ぎょしょくせい	魚を常食とすること
こうじつせい	植物体の一部が光の強い方えへ向って屈曲する性質
こしょうがく	湖沼の成因、形状、水温、水質、科学、成分、生物、利用法などを研究する学問

Compound morphology 13: Inferring CW meanings 3

Materials:

30 technical terms; mostly botany, zoology, medical science, psychology, linguistics

Conditions:

3 within-Japanese group;

Technical terms in either kanji, hiragana or English

1 between-group; Terms in English for American

Participants:

Japanese and American undergraduates

Results:

Mean correct matching for Americans at a little over 50%, but for Japanese-kanji condition, mean approaching 100%.
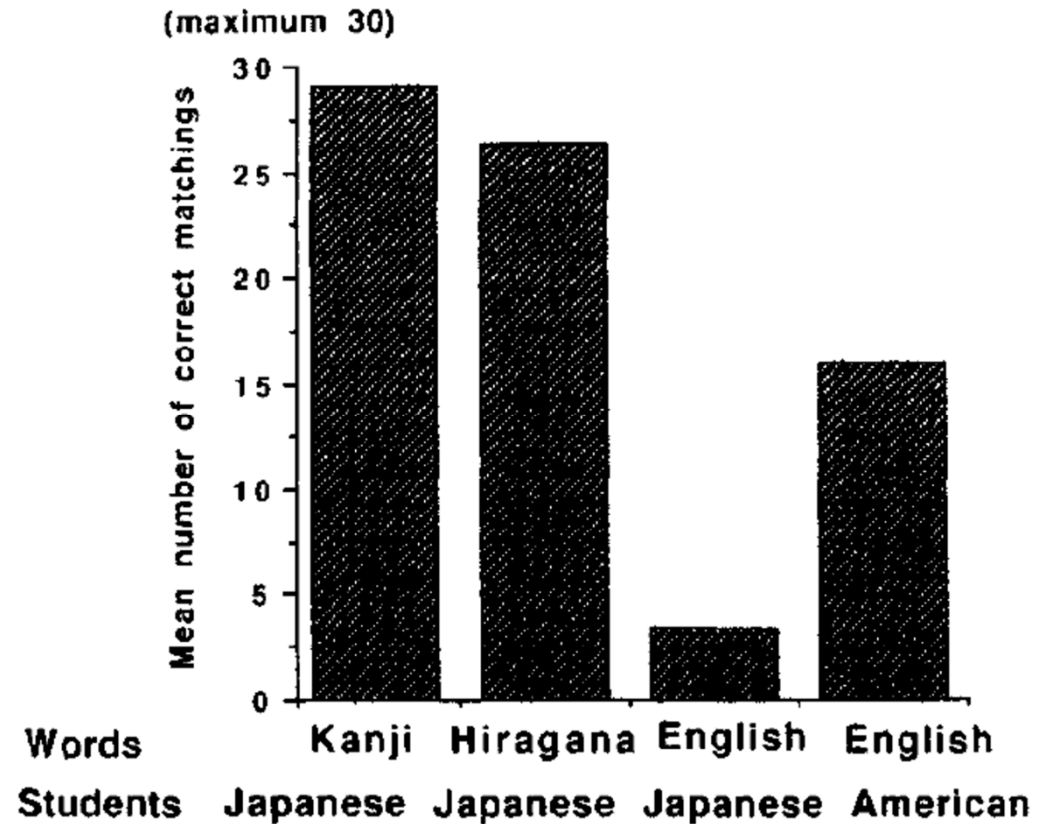
Overview

- Opening remarks

- Multiple scripts as a chaotic factor?

- Dual-readings of kanji as a chaotic factor?

- Compound morphology as a systematic factor?

- Closing remarks

Closing remarks 1

Returning to our title question, is it more apt to regard JWS as *systematic chaos* or as a collection of *chaotic systems*?

Number of initial quotes stress multiple scripts as chaotic factor. As part 1 sought to convey, basic orthographic conventions are to use the multiple scripts in complementary ways.

And yet, JWS's pervasive levels of graphematic variation may just reflect a rather different perspective towards writing;

Joyce & Masuda (2019: 113): As the sheer range of these intentionality factors testify, more than simply affording the JWS with a capacity for written variation, the vastly expanded nature of the Japanese graphematic solution space would seem to foster a unique awareness for written language and even a penchant for innovative forms of Japanese graphematic representation.

Closing remarks 2

Part 2 noted that dual-readings – also often cited as a chaotic factor – are a direct consequence of how Chinese characters were adapted to writing Japanese.

Essentially to (1) associate Chinese characters with NJ morphemes (so kun-yo.mi or meaning-mapping) and (2) accept Chinese morphemes into Japanese (so on-yo.mi or reading by sound).

An intriguing consequence of many kanji being associated with dual-readings is an interesting form of allography, especially as SJ morphemes are predominately bound components of CWs!

Of course, exceptions exist (to be expected with human systems over time!), but section on compound morphology sought to illustrate how most CWs are pretty systematic in nature, which represents as a major plus for the JWS overall.

Closing remarks 3

Interestingly, after cautions against approaching reading from the concept of **primacy** (i.e., primacy of speech over writing),

Rastle (2019: 680): [comments] English has an alphabetic writing system and so its primary regularities are indeed between spelling and sound (more specifically, between graphemes and phonemes). However, the ultimate goal of reading is not to map symbols to sounds, but to map symbols to meanings, and this consideration brings different forms of regularity into view.

(first sentence included not to take point totally out of context)

Although importance of meaning-mapping should be axiomatic for researchers of writing systems, it also bears noting that Rastle has been motivated to reiterate the point!

Next slide tries to schematically capture Rastle's concern with respect to the triangle model (Seidenberg & McClelland, 1989)

Closing remarks 4

Unquestionably, writing systems research in general, and writing system typologies in particular, should continue to further elucidate the ingenious ways writing systems represent phonology (red base).

Such research, however, should not overlook the importance of the grapheme-meaning mapping (green side).
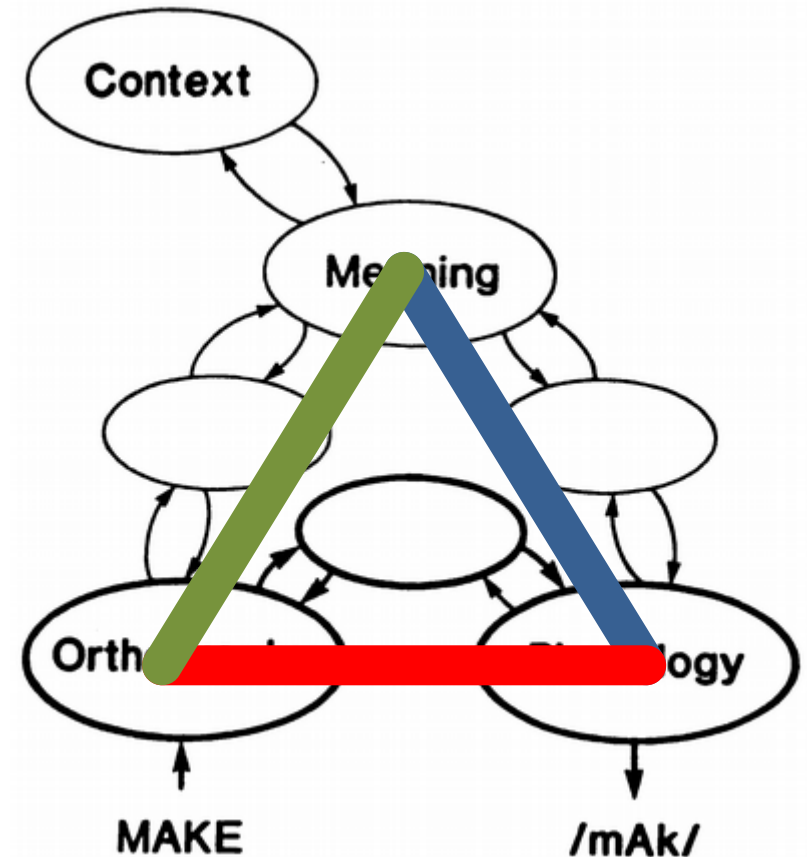
In that context, Japanese compound morphology, in reflecting the rich connections between morphographic kanji and both NJ and SJ morphemes, undoubtedly warrants far greater attention.

Thank you for your kind attention

ご清聴ありがとうございます

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