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Towards a 'Real Character' for the Computer Age

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Abstract

This paper deals with the theory of a 'Real Character,' that is to say, a form of writing which conveys ideas, rather than sounds, and the possible application of such a system to computer-mediated communication. The need for increasingly efficient international communication is noted and the idea of 'iconicity' is incorporated into the argument, together with the narrower idea of the 'symbol' as defined by the semiotician Charles Sanders Peirce. Historical antecedents from the seventeenth century onwards are examined, as are present-day artificial languages. Modern research into semantic primes is linked to work on visual primes. The notion of 'the sentence-as-character,' is proposed, a format which dispenses with the need for linear syntax. The question of metaphorical meaning is discussed in the light of theories of embodiment. In order to facilitate speedy reading, on-screen Rapid Serial Visual Presentation of texts with animation, colour and 3-D

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is proposed. Technological issues of computer implementation and further development are raised, ways forward are examined, and cultural and linguistic problems tabled for further consideration.

Keywords: character, icon, pasigraphy, prime, syntax

1. Introduction: Fast Forward

July 25th, 2030. Andrea Martin comes down to breakfast, picks up her solar-charged 'wraparound,' and slips it on. It resembles a pair of sunglasses that gives a 'heads-up' display of the sort used by military pilots. She needs no password—the machine automatically picks up her DNA from her hands. Only *she* can access the system. With a series of blinks, she selects 'Mail' from the menu.

Immediately, picture-like icons, together with small written characters, not unlike Chinese or Japanese, begin to run like an animated film in front of her right eye. By coincidence, this is a message from her Japanese friend Masumi, but Andrea is not reading Japanese. The message is encoded in 'Real Character' (RC), in which concepts are encoded as symbols, i.e., the symbols represent 'reality,' not phonetic values. There is no sound. The syntax of the message is presented serially, in a gradual manner, not in an all-at-once linear block. Andrea has chosen to have the sentences presented in the order Subject-Verb-Complement, as that corresponds to her native English. Masumi wrote it in the Japanese order Subject-Complement-Verb. Various orders of writing and presentation are equally possible for speakers and readers of other languages.

This is a *pasigraphy*, a form of language designed only to be read. There are, however, no 'letters' representing sounds. Meaning is represented directly or quasi-directly. Icon-like images of concrete objects immediately convey their referents, and more abstract concepts are represented metaphorically by lines and

shapes whose form and composition relate directly to psychological constructs. Colour, 'virtual' depth, and animation also help to convey the meaning.

In 2030, reading has moved from printed sound set in a static, linear order to direct meaning in which readers, whatever their native language, choose the order of presentation at their own rate. In the words of Baron (2009), humans have found 'a better pencil.'

To see how this might be achieved, we shall here examine the need for international communication, the use of symbols in multi-media, historical antecedents of the proposed pasigraphy, and ways of incorporating basic visual principles into a computer-mediated system.

2. Internationality

In today's world, as international communication becomes ever more important, so language comes increasingly to the fore. China has moved to an economic peak, and the growing strength of that country as an industrial power means that the West needs a means of communication that bypasses the difficulties of the regional languages of China, as well as Mandarin (Putonghua), spoken by some 70% of the population. The complexity of the language's character-based script (Zhongwen) may seem almost impenetrable to the Western reader coming from an alphabetical tradition.

While English remains the universal language of science, technology, the Internet, and other fields, the number of speakers of Chinese (c. 1.33 billion) already exceeds that of speakers of English (c. 1 billion). Given the exponential nature of population growth, the gap between the total of Chinese and English speakers can only widen. Furthermore, while English lies second in the list of world languages with c. 500 million speakers, Hindustani (Hindi/Urdu) has about 497 million speakers. Despite the wide

differences in the writing systems of these world languages, it is, paradoxically, through writing and a pasigraphical system, rather than through speech, that a *rapprochement* may be made. Such an idea is by no means new.

In *Das Glasperlenspiel* (*The Glass Bead Game*), Hermann Hesse (1943) wrote of a fictional world of the future in which scholars devote their lives to an attempt to bring together all knowledge, and make relationships among disciplines apparent in an activity known as 'The Glass Bead Game.' This deeply philosophical game begins its ascendancy after a Parisian scholar writes of the dangers that would face culture, "if it neglected to develop an international language of symbols. Such a language, like the ancient Chinese script, should be able to express the most complex matters graphically, without excluding individual imagination and inventiveness" (p. 38). Nowhere in the book does the author ever give any clear idea of this language, nor does he give any examples of the 'characters,' 'hieroglyphs,' 'formulae,' and 'abbreviations' that he mentions. His 'international language of symbols' is merely a concept, an idea, a dream.

To create a theory of a pasigraphical system as envisaged in the Introduction to this paper will be to indulge in a sort of 'glass bead game,' bringing together ideas from a variety of disciplines. Concrete proposals may ultimately evolve for both the form of the pasigraphy and the technology that will enable its implementation, but first comes the theory.

3. Technology and Writing

The computer is not a book. Indeed, its technology is so different that it removes the field of reading and visual communication to a more complex, dynamic, and independent plane. A product such as Kindle™ accesses the Internet, stores

multiple books virtually and allows one to choose one's font-size. However, this is merely a slight advance on the library, the bookcase, and the magnifying glass.

The capacity of the computer today remains in a dyadic condition, with its creative side roving through a fantasia of CGI, multi-media, and interactivity, while its textual side remains anchored in a Gutenbergian universe, presenting static printed text and images much as in the fifteenth century. If it is to come into its own and move away, through 'virtuality,' from the limitations of the physical world of text, then its potential for other ways of reading and visualising must be explored. Present-day technology offers the possibility of progressing from writing which is phonetically based and presented in a block-like, linear fashion to that which is semantically-based and presented serially, taking advantage of such affordances as 3-D, animation, colour, and the use of icons.

4. Technology and Texting

Writing has already moved some way to becoming a visual semantic system. Commercial logos need no orthographic interpretation. McDonald's™ Golden Arch 'M' needs no completion of the company name to signal its presence on a highway or at an airport. When used virtually, too, language is moving away from purely sound-based orthographic conventions to more visual means which convey meaning directly. 'Facebook' is identified by a single, distinctive 'F' and 'Twitter' by a blue bird.

'Emoticons' represent another move towards ideographic representation. The use of these symbols in texting (SMS) and on iPhones™ and other 'smart' devices is widespread. The symbols are not, however, international, and Japanese emoticons, for

instance, differ culturally from their western counterparts, e.g., Japanese (-_-;) = 'unamused.' Even where an SMS text abbreviation such as *4u* represents a phonetic transcription of the English *for you*, the same *4u* is used to represented *für dich* in German, where it simply becomes a symbol with no corresponding German sound, but with the same meaning, 'for you' (Crystal 2008). The symbol itself assumes meaning, moving away from sound and towards semantic representation.

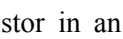
5. Icons and Iconicity

The notion of *iconicity* is deeply involved in a *real character* such as is proposed here. In spoken language, elements of form which convey meaning directly range from volume used to convey subtlety or emphasis, through grammatical constructions (e.g., 'lengthy sentence = important sentence'), to accompanying body language which reinforces what is being said (Simone 1994). *Pictorial* symbols which convey meaning more or less directly, such as illustrative road signs, are known as *icons*. With icons, there is a degree of isomorphism between the sign used and its referent. 'Any language of images is based on the alleged fact that images exhibit some properties of the represented things' (Eco 1995: 169). Hofstadter (1979: 9) defines isomorphism as 'an information-preserving transformation,' i.e., the essential information of the referent is transferred to the symbol.

However, Kress & van Leeuwen (1996: 7), writing from the point of view of social semiotics, note that the elements chosen for what are essentially visual metaphors depend in part on the interest of the *maker* of the signifier and the *context* of the production. Semiosis cannot exist in a social vacuum.

Horton (1994: 145) notes: "The purpose of an icon is not to tell someone what something looks like, but to remind them of

something they already know." Leach (1976: 12) defines icons as having "*planned* resemblance" (my emphasis). However close to its referent, though, a visual sign does not make meaning absolutely direct. "The icon does not 'spell out' meaning, but implies it" (Sassoon & Gaur 1997: 48). This is confirmed by the fact that there is no definite pronunciation for any given icon—it conveys meaning more or less regardless of language, and hence may be internationally interpretable.

The term *icon* itself is drawn from the work of the semiotician Charles Sanders Peirce (1839-1914). Peirce distinguished between three types of sign, the *icon*, the *index*, and the *symbol*. Unlike *icons*, which convey meaning more or less directly through isomorphism, the *index* conveys meaning by association. Thus, grey clouds are a sign of rain, and smoke is a sign of fire. *Symbols*, on the other hand, are more arbitrary. Thus the *symbol* for a resistor in an electric circuit () consists of an entirely arbitrary set of lines, whose meaning is accepted by convention in the community of practice that uses it. There is no resemblance between the *symbol* and its real-world counterpart.

Pope (1999: 203) notes, "We ourselves are far more graphicate than our grandparents, and perhaps less literate; at any rate, there are many contexts from packaging to computer screens, where we seem to prefer icons to the written word." This preference may be explained by the fact that ". . . in visual communication, content is never detached from form" (Dondis 1973: 104). In RC, the writing system itself carries information, whereas alphabetic and similar writing systems merely carry sound in graphic form. In images, "you see content and form simultaneously, they must be dealt with as one single force delivering information the same way . . . symbol and meaning appear as one reality" (ibid.: 106-107).

Barker & van Schaik (2000: 163) note that a number of criteria must be met if icons are to be efficient. These (together with my summary explanations) are: Distinctiveness—clear variation in

relation to others with which it is used for a particular application; intuitiveness—the ease with which a user can deduce its meaning; stimulus strength—this usually depends upon the objects that it embeds and various physical characteristics such as its shape, size, and colour; learnability—a good icon should be easy to learn; memorabilty—the icon should be easy to remember; recall effectiveness—how effectively the icon's meaning can be recalled by a user from long-term memory. This list corresponds quite closely to that of Chao (1968), who demands of any 'symbol' (in the broader sense, i.e., sign) that it should, *inter alia*, be simple and elegant, show a clear relationship between symbol and object, be easily producible, reproducible, and transmissible, and that each symbol should be easily discriminated from others.

An RC of the type envisaged here, then, with its emphasis on the visual, must include efficient *icons*, particularly for concrete objects, and *symbols*, for abstract ones. *Indices* may be used as associative or more metaphorical signs. (Kress & van Leeuwen (1996: 7) point out that all signs are essentially metaphorical, a point to which we will return below.)

6. Reading

To understand the need for iconic communication in a high-speed world, it is necessary to understand the process by which reading normally takes place.

Spoken language is faster than the process of writing (about 180 words per minute being the average for speech in English), but the reading process is even faster than speech, about 250-300 w.p.m. being the speed necessary for the mind-brain to process smoothly without regressions (Grabe 2009). Good readers scan text for information at about 600 w.p.m. Reading takes place in short moments of focus called 'fixations,' when the eye's *fovea centralis*

(where the rods are most densely concentrated) is still. In a fluent reader, the length of a fixation is approximately 0.25 of a second (Crowder 1982). Good and bad readers fixate for much the same time but the difference in quality of reading is due to the fact that the good reader will take in more words in a single fixation than the poor reader, i.e., the good reader's visual span is, effectively, wider. Lines of about 15 words (70 characters) suit good adult readers, allowing them to take in a number of words at each fixation.

While fluent reading consists of two parallel processes, one of *recognition* and the other, applied if necessary, of *decoding*, it is most effective when words are *recognised* rather than being decoded letter by letter or syllable by syllable, i.e., when words become holistic signs, rather than phonetic transcriptions. An RC would take this process one step further, creating signs for meaning through an arrangement of lines and characters.

7. Real Character: Some Historical Precedents

The 2030 communication-system described in the Introduction is, of course, imaginary, but just as language has its roots in the past, ideas for the future in the Computer Age may build upon those of bygone eras, and, as Sassoon & Gaur (1997: 70) note, "If we are to utilise the full scope of computer generated iconographies, we could do well to study historic examples." The way forward to rapid and fluent international human communication via the computer may perhaps be found, paradoxically, by looking backwards to the concept of a *universal language* and attempts to create such a system.

The idea of a *universal language* is usually taken by the layman to be something like Esperanto (1887), an *a posteriori* artificial auxiliary language, composed of simplified elements of natural

languages which already exist (hence, *a posteriori*) with a simple grammar, or else a logic-based language such as Loglan (1960) or Lojban (1989). Okrent (2009) lists 500 artificial languages, many of which are of the *a posteriori* auxiliary variety.

Not unnaturally, those who devised systematic projects for universal languages in the 17th and 18th centuries became known as 'language projectors.' Two concepts important to these linguists were those of *universal character* and *real character*. The term *universal character* meant a set of arbitrarily-chosen symbols which could be read off in any language, just as Arabic numerals, musical notation, and chemical formulae are today. The most well-known of these systems is that of Francis Lodwick (1647), entitled *A Common Writing* (Salmon 1972). This system used arbitrary characters, modified according to meaning and function, which were placed on a stave, rather like musical notation.

Such a system, however, did not reflect an underlying taxonomy of reality as science then perceived it. A scientific taxonomy of the world, however, would provide a 'true' version of reality on which a writing system might be based, hence the name, '*Real* Character.' George Dalgarno (1661) attempted such an approach, which conformed more closely to the idea of the 'technical word,' i.e., a word constructed so as to show its meaning (Knowlson 1975, Cram & Maat 2001). Dalgarno's system was more scientific than that of Lodwick, as he devised a taxonomy and to each category ascribed a letter, e.g., A = Being or thing; F = Artificial concrete; N = Physical concrete, and so on. Thus, since animals are 'physical concrete,' the names of all animals begin with the letter N.

To the language projectors, a 'natural language' was a language which reflected nature (Slaughter 1988, Lewis 2007), and so their Aristotelian taxonomic analyses of the world were carried out *in advance* of the creation of a language (hence, *a priori*). This enabled concepts to be expressed in a neutral but highly scientific language, in which the form of a word was also, in part, its

definition. John Wilkins's *An Essay towards a Real Character and a Philosophical Language* (1668), from which the present paper derives its title, aimed "to provide a means of communication in which every written or spoken symbol was isomorphic with the categories of reality (as perceived by the mind) which were represented directly and without the medium of a natural language" (Salmon 1988: 99).

Wilkins's analytical tables of the natural and spiritual world began with 40 genera and divided these into ever-smaller categories. Each entry for a word at the end of a 'tree' in the tables could be configured into a symbol. The projectors held that the symbols used to create their real characters should be *ad placitum* (arbitrary), rather than *ex congruo* (iconic). Thus, there is nothing *iconic* about the character to give a guide to its meaning. Wilkins's symbols are merely mini-maps or route-finders to points in the tables and unless the reader knows the tables by heart, he/she cannot construct the meaning without the book open on the table. As Jenkins (1965: 244) notes, a user of the language "would have needed superhuman patience to clamber up and down the referential staircase every time he wanted to piece a word together." (It is also for this reason, perhaps, that there is no evidence that the proposed spoken version of Wilkins's Real Character ('the philosophical language') was ever used in conversation (Rhodri Lewis 2011, Jaap Maat 2011, personal communications).) In short, while meaning may be accessed from it, Wilkins's Real Character makes no 'visual sense' (Singer 1989). Although ultimately doomed to failure, Wilkins's system gave rise to, *inter alia*, Roget's *Thesaurus*, a fact which Roget himself acknowledged (Roget 1852).

Throughout his life, Gottfried Leibniz (1646-1716) considered the problem of a *characteristica universalis*, relating thoughts to symbols. This "logical algebra' would be 'applicable to all ideas and all objects of thought" (Couturat & Leau 1903: 23; my translation). His use of visual elements would, he notes, include

points, lines, and angles. He proposed "to represent visible things by their features, and invisible ones by the visible ones which accompany them" (Yaguello 1991: 35). This suggests something like the icon/symbol dichotomy. Leibniz noted, 'The whole of such a writing will be made of geometrical figures, as it were, and of a kind of pictures—just as the ancient Egyptians did, and the Chinese do today' (Maat 2004: 291). He never worked out such a scheme in full.

Modern attempts at pasigraphies or allegedly 'universal' languages, such as those of Hankes (1992) and Yench (2003), generally make no appeal to the visual and rely on reference tables, much as Wilkins did. Haag (1902), however, not only attempts visual representations of key spatial concepts such as || 'near,' | | 'far,' |·| 'in,' and so on, but also attempts a logically-based pasigraphy based on the metaphorical use of such concepts. The 'ground' of the metaphor for many concepts is spatial, e.g., for time, "immediate = right in front of," for degree, "defined = somewhere," and for material, "loose = far apart," thus pre-dating by nearly eighty years the work of Lakoff & Johnson, who believe that language has its roots in our bodily perception of the world, our physical orientation and our ability to use these factors in the creation of metaphors (Lakoff & Johnson 1980, 1999).

Carus (1904) uses icon-like characters in which closely-related concepts are depicted by closely-related symbols, e.g., *some*/*any*. Furthermore, he borrows from Lodwick the use of a stave-like format to set out the syntax of the proposition. Charteris (1972), created a pasigraphy named 'Paleneo' ('old-new') using well-known symbols drawn, *inter alia*, from maths, e.g., Σ for 'total,' and from biology, e.g., ♀ for 'female.'

The most well-known pasigraphy is that of *Blissymbolics*, invented by Charles Bliss (1897-1985) (born Karl Kasiel Blitz). This system was first published as *Semantography* (Bliss 1949), but only became more widely known when it began to be used to

assist verbally handicapped children in Canada (Helfman 1981). The system is based on 100 combinable symbols, some iconic, e.g., 'house,' others more symbolic, e.g., 'knowledge.' The system has been successfully used to assist the deaf and the physically handicapped, and can be used to clarify meaning in foreign-language teaching (Maun 2009). It finds approval among some modern writers, e.g., "The careful organisation of the arrangement of the symbols is admirable and the logic behind much of the symbolism is quite charming" (Crow 2006: 89). Nevertheless, Sproat (2010: 230) is critical of the 'atomic composition' of such a system: ". . . There are never enough of these atoms to make all the distinctions that spoken—and written—language can make. . . . One may look at a system like Blissymbolics and note that it is possible to distinguish perhaps several thousand words. This may seem like a lot, but compared to the active vocabulary of averagely educated people, which numbers in tens of thousands of words, it is quite small."

The lack of success of historical pasigraphies, however, is not a barrier to future progress in the field, thanks to technological change, and it is therefore necessary to now to examine how such a system might work.

8. Meaning Represented Visually

The problem of depicting the semantic representation (SR) of a proposition is a problem of infinite regress. Seuren (1969: 219) notes, "It has often been stated that, essentially, meanings cannot be described in language, . . . any description in terms of language, natural, or artificial is bound to have its own meaning in turn, a description of which will again have its own meaning and so on."

Goddard (1998: 66-67) points out that a formula for an SR in

an abstract metalanguage such as that of Jackendoff (1991) or Katz (1972) "can serve its function only if it is intelligible, and the only way we can understand formulas . . . is via our knowledge of the meanings of English words . . . To understand the formula we have to turn it back into ordinary English, undoing the 'deformation' that has been involved in turning it into a technical formula in the first place." Furthermore, an SR written in highly symbolic formulae can involve representations which are more complicated to understand than the words which it represents. Katz's representation (1972: 358) of the verb *open* involves concepts such as 'CAUSE,' 'EVENT,' and 'PHYSICAL CONDITION' and words such as *barrier*, *passage*, and *enclosure*, all of which are probably more complex than the notion of 'open.' The attempt to define meaning thus becomes viciously circular.

A more fundamental question is perhaps: 'Should the semantic representation of an English proposition be written in English?' In other words, how can both object language (the language being described) and metalanguage (the language doing the describing) be the same? Furthermore, if the semantic representation involves English words, then what does the SR of the SR involve, and how are the words within that SR represented in a further SR? And so *ad infinitum*.

Moreover, the SR of *I like chocolate* (English), or its translations, e.g., *Ich mag Schokolade* (German), *J'aime le chocolat* (French), *Rydw i'n hoffi siocled* (Welsh), *Is maith liom seacláid* (Irish), or their equivalents in any other language, must be the same, and it is therefore necessary that such an SR should not involve words in any *given* language. What is required is a *language-independent* system of representation. The answer may lie in a combination of *semantic* and *visual primes*.

9. Semantic Primes

The search for semantic primes has been pursued almost relentlessly by the Polish linguist Anna Wierzbička (e.g., Wierzbička 1996) and the Australian Cliff Goddard (e.g., Goddard 2010). Their principle of 'reductive paraphrase' or Natural Semantic Metalanguage involves "a paraphrase composed in the simplest possible terms, thus avoiding circularity and obscurity" (Goddard 1998: 56). Such a paraphrase is dependent upon a set of "semantically primitive expressions, which cannot be defined any further" (ibid.: 57).

Through careful analysis of a large number of languages from various unrelated families, Wierzbička and Goddard have expanded an initial list from 14 semantic primes to over 60. These (selectively) include: YOU, SOMEONE, SOMETHING, BAD, and SAY. (To the full list, Goddard and Wierzbička have recently restored DON'T WANT (Cliff Goddard 2012, personal communication).) This set of semantic primes makes up a complete lexicon from which all paraphrases may be composed. Thus 'slander' might be analysed as 'SOMEONE SAY SOMETHING BAD about YOU.'

An immediate problem is that 'about' is not a semantic prime and has to be 'imported' into the vocabulary. Similarly 'insult' might be rendered as 'SOMEONE SAY SOMETHING BAD to YOU,' but, again, 'to' is not a prime and would have to be similarly imported into the lexicon. Despite such minor drawbacks, the work done by Wierzbička and Goddard provides a valuable basis on which to build when creating a symbolic language of the type here under consideration.

Their semantic primes would need to be incorporated into a visual system of communication of the type proposed by RC. It thus becomes necessary to find visual primes which can represent semantic primes. If visual symbols are to be constructed into a

system of communication so as to represent meanings, there will be a need to establish precisely which visual elements can be used to create isomorphism between symbol and referent, before one considers the overall appearance of a system of characters. It will also be necessary to know how they may be made to function in a particular way, e.g., to represent concepts such as 'tenderness' or 'authority.' Creation of the RC thus demands a systematic approach to design.

10. The Design of a System

10.1. Characters

The task for the designer of an RC, then, is to combine the requirements of Barker & van Schaik (2000) with those of Chao (1968), and to link these to the use of semantic and visual primes, as well as with other universal features of good design, e.g., alignment, consistency, good affordances (i.e., form following function), use of redundancy, Gestalt principles, and so on (Lidwell et al. 2003). The design will thus be constrained by a number of parameters.

The analyses made by Dondis (1973) and Frutiger (1989) of the components of visual literacy may serve as a starting point for the creation of RC characters. These in turn may lead to a set of provisional *metarules* for the formation of characters, from which particular rules may be derived. They may then be applied to semantic primes, e.g., those of Wierzbička and Goddard, and thence to a basic lexicon, from which more complex characters may be developed. These provisional metarules will also cover metaphorical use, of which more below.

10.2. Visual Primes

10.2.1. The Dot

Dondis regards the dot as the basic 'atom': "The dot is the simplest, irreducibly minimum unit of visual information" (Dondis 1973: 40). Frutiger's definition is similar: "In graphic terms, the dot or point is a materialized area, recognizable by the human eye. It is the smallest graphic unit, as it were the 'atom' of every pictorial expression" (Frutiger 1989: 23). A dot "generally takes its meaning from a relationship with another sign" (ibid.). Thus a dot in the middle of the circle can symbolise 'centre.'

(1) Proposed metarule No. 1
Characters with core meanings relating to minuteness, points in space or time, centres, foci, or lack of extension will incorporate dots into their formation.

10.2.2. The Line: Horizontals and Verticals

"The prototype line is conceived of from the start as a straight line" (Frutiger 1989: 24). Frutiger (ibid.: 26) moreover points out that "our field of vision is much more extensive in the horizontal than in the vertical. . . . The horizontal is given: the vertical has to be made. Humans are accustomed to comparing their activity with passivity, and in the same sense a vertical exists only by comparison with a given horizontal." Horizontal lines in RC will thus have different meanings from verticals. They will represent the given, the flat, the base upon which verticals may rise, and so on. They will be suitable for the representation of corresponding horizontals in the referent, such as shelves, or flat space, the ground, bases, and so on.

Verticals, on the other hand, will be used for uprights in the referent, e.g., a house, and in words representing trees, masts,

poles, walls, pylons, chimneys, and so on, which emerge from the base horizontal in the real world, namely, the ground. Thus '|' may serve as the basis of a pictographic RC character representing any of these latter concepts, whereas '—' would be unsuitable, lacking isomorphism, but would be suitable for 'ground,' 'base,' and so on.

(2) Proposed metarule No. 2
Characters with core meanings relating to or having verticality or horizontality as an essential element will incorporate vertical or horizontal lines into their formation.

10.2.3. The Diagonal or Oblique Line

Where verticals and horizontals give the idea of stability in the world of human vision, the diagonal has "the opposite formulation, the most unstable directional force, and consequently the most provoking visual formulation. Its meaning is threatening and almost literally upsetting" (Dondis 1973: 46). With regard to intensity of meaning, Frutiger (1989: 26) notes, "An oblique line is always judged in relation to the nearest horizontal or vertical. The more an oblique line approaches or departs from one or other of these (i.e., deviates from an ideal angle of 45º), the more its expression changes. The closer it approaches the horizontal, the stronger is the impression of lifting, while a closer approach to the vertical strengthens the impression of falling." Close-to-horizontal diagonals will thus be suitable in an RC system for the representation of slopes, ramps, banks, gradients, and so on, while close-to-vertical oblique lines will perhaps be better suited for more metaphorical (i.e., non-real world) uses such as falling, instability, uncertainty, and so on. See below, 10.4 Metaphor.

(3) Proposed metarule No. 3
Characters whose core meaning relates to obliquity, instability, or falling outward will incorporate oblique lines into their formation.

10.2.4. The Curved Line

In RC, the curved line may represent the convex, e.g., a hill, a lens, a bubble, or the concave, e.g., a basin, bowl, or hollow. Concavity is perceived to occur in that which exists, whereas convexity represents that which is coming into being, growing, and so on (Frutiger 1989). The wave may represent that which is both convex and concave, e.g., a bumpy road, the banks of a river seen in plan, or that which is always in fluctuation, such as flames.

(4) Proposed metarule No. 4
Characters whose core meaning relates to concavity, convexity, or fluctuation will incorporate curved lines or waves into their formation.

10.2.5. Shape

The three primary shapes which may be formed from lines are the square, the equilateral triangle, and the circle (Dondis 1973: 44). It should be noted that since these basic shapes incorporate vertical, horizontal, oblique, or curved lines, it follows that the next metarules follow logically from the earlier ones.

(5) Proposed metarule No. 5
Characters whose core meaning relates to a physical object having geometric shape will incorporate an isomorphic geometric shape into their formation.

(6) Proposed metarule No. 6
Characters whose core meaning relates to a physical object having no definite geometric shape will incorporate isomorphic lines of the appropriate variety.

10.3. Balance and Stress

"Equilibrium . . . is man's firmest and strongest visual reference" (Dondis 1973: 22). As viewers seek stability in their own environment, so they look for stability in the image, seeking axes of balance. "In visual expression or interpretation, this process of stabilization imposes on all things seen and planned a *vertical* 'axis' with a horizontal secondary referent [sic] which together establish the structural factors that measure balance" (ibid.: 23).

Regularity, simplicity, and balance in image create an effect in the viewer of repose. Irregularity, complexity, and lack of equilibrium produce the opposite effect, namely that of stress. These factors, then, must play a part in the composition of characters for RC.

(7) Proposed metarule No. 7
Characters whose meaning relates to regularity, simplicity, and balance will incorporate their visual equivalents through evenness of line-spacing, sparseness and predictability of construction, and equilibrium with the 'felt' vertical and horizontal axes.

(8) Proposed metarule No. 8
Characters whose meaning relates to irregularity, complexity, and lack of balance will incorporate their visual equivalents through unevenness of line-spacing, richness and unpredictability of construction, and lack of equilibrium with the 'felt' vertical and horizontal axes.

10.4. Metaphor

Kress & van Leeuwen (1996) draw attention to the 'meaning' often ascribed to geometrical shapes. They note that the square may represent 'honesty, straightness, and workmanlike meaning.' They cite Thompson & Davenport (1982) for whom it represents 'the world and denotes order.' Circles, however, represent 'endlessness, warmth, protection' (Dondis 1973: 44). In summarising such distinctions in semiosis, Kress & van Leeuwen (1996: 53) point to a fundamental distinction between symbols that represent the technological world and those that represent the world of nature, the former principally involving straight lines, the latter curved ones.

Liungman (1995) notes that symbols may have a single or multiple axis and whether and they may be open or closed. An informal analysis by the present writer of the 600 + symbols in Liungman's book seems to show that straight lines are usually associated with at least the following, which we may term 'hard' concepts:

(9) Hard concepts related to straight lines
angularity, awkwardness, dominance, firmness, ground, hardness, inflexibility, insistence, joining, masculinity, measure, order, power, protection, reason, strength, support, . . .

Curved lines seem generally to be associated with at least the following 'soft' concepts:

(10) Soft concepts related to curved lines
accommodation, beauty, comfort, femininity, flexibility, flow, gradualness, hollowness, integration, involvement, liquid, receiving, smoothness, softness, . . .

These are certainly extreme generalisations, and there any many other categories and many exceptions.

Frutiger (1989) also notes that closed symbols represented completed actions, or objects, while open symbols suggest incompleteness.

(11) Proposed metarule No. 8
For metaphorical concepts, straight lines are used for 'hard' concepts, curved lines for soft 'ones,' both types appearing in characters for concepts which may be regarded as multi-faceted.

(12) Proposed metarule No. 9
Closed symbols will represent completed actions or objects, open symbols, incompleteness.

10.5. Metaphorical Use of Characters

As noted, all signs are to a degree metaphorical, and language draws metaphors from bodily experience. Haag's (1902) attempts to demonstrate this in his pasigraphy are somewhat tentative, e.g., 'tight = close,' 'loose = far apart,' but the work of Lakoff & Johnson (1980, 1992) is more thorough and complete, and demonstrates the ways in which human cognition relates to life as experienced through the body.

Lakoff & Johnson (1999: 50-54) list exemplar metaphors and the reasons for their use. Thus:

(13) a. *Happy is up*—'I'm feeling *up* today'—Primary experience: Feeling happy and energetic and having an upright posture (correlation between affective state and posture);
b. *Intimacy is closeness*—'We've been *close* for years, but we're beginning to *drift apart*'—Primary experience: being physically close to people we love;

c. *Help is support*—'Support your local charities'—Primary experience: Observing that some entities and people require physical support in order to continue functioning;
d. *Change is motion*—'My car has gone from bad to worse'—Primary experience: Experiencing the change of state which goes with the change of location as you move.

In representing such concepts in RC, primary symbols for 'up,' 'close,' 'support,' 'motion,' and other terms used by Lakoff & Johnson will form part of characters, marked in some way, e.g., by the use of colour, as being 'metaphorical.'

Thus '‖' may mean 'close' in literal terms and will appear in black. When used to mean 'intimate,' it will appear in colour. Similarly '| |' may mean 'distant,' and if used metaphorically, e.g., of a relationship, would appear in colour. Other examples:

(14) a. If '┬' means 'support' in black, then it may mean 'help' in colour.
b. If '→' means 'motion' in black, then it may mean 'change' in colour.

Similarly, transferred meanings may be used for elements of Goddard and Wierzbička's semantic primes list (see section 9), e.g., '|' may be involved in presenting the semantically prime notion of 'ALIVE' (i.e., capable of standing), whereas '__' would be used for 'DEAD,' i.e., lying down. Similarly, '|' must occur in 'SOMEONE,' 'PEOPLE,' and (human) 'BODY' in order to give the sense of verticality.

(15) Proposed metarule No. 10
Lines used in RC characters which have metaphorical meaning will accord with their central embodied notions

('up,' 'down,' 'near,' 'far,' and so on) and will follow the lines used in those literal meanings. Colour may be used to distinguish metaphorical from literal characters. Appropriate lines will be used to represent semantic primes.

Before examining the formation of an RC, it is necessary to look at a system of existing characters and its underlying principles, namely that of Chinese writing.

11. Chinese: Myths and Radicals

The language projectors of the 17th century were greatly influenced by the then prevalent myth that Chinese characters conveyed meaning directly and that the writing system was not a representation of sounds. Chinese writing, however, never was a Real Character. DeFrancis (1984) and Unger (2004) demonstrate clearly that, while the Chinese system contains descendants of early pictograms, it is a morphosyllabic or morphophonological system rather than a pictographic or ideographic one. Its characters depict morphemes (the minimal unit of grammatical analysis) and more than 80% of them are semanto-phonetic, with indications of pronunciation being attached to a semantic radical.

"The basis of the traditional Chinese writing system is 214 elements often referred to as 'radicals.' These radicals are used both independently or as part of more complex characters" (McNaughton & Ying 1999: 12). The 'radicals' (whose number varies, according to one's source (Robinson 1995)) are, in general, semantic and thus assist the reader to decipher the meaning of the character. (Some do not have any semantic function.) It should be noted that DeFrancis prefers the term *signific* to *radical.*

The language projectors of the 17th century also used radicals,

but in a different way. In Wilkins's case, having divided the world into 40 Aristotelian genera, he devised a symbol for each genus, which then formed the basis for characters within that genus. These symbols all consisted of a straight line with some central modification such as a diagonal line, a curve, or a circle upon it. While this 'radical' helped to identify the meaning of character, it also meant that all 'differences' within the genus looked very similar, and constant reference to the tables was necessary in every case in order to establish exactly which difference or species was meant. Wilkins and others failed Chao's (1968) criterion for distinctiveness of characters.

The notion of 'radicals' used by the language projectors and the Chinese system may have application for RC. While *icons* by their nature may be fairly transparent, *symbols* work only through acceptance of convention. They have to be *learned* before they can be recognised, unlike good icons. It may therefore be necessary to add to symbols a *radical*, *signific*, or *classifier* to give the reader of RC a rough guide to meaning, in much the same way that radicals may guide the reader of Chinese. In principle, this would mean a limited group of sub-symbols, rather than the 40 genera of Wilkins (1668) or the Roget-like list of categories advocated by Hankes (1992).

The Chinese use of radicals has one further feature which assists in determining meaning, namely the positioning of the elements. Approximately 75% of Chinese phonetic compounds have their semantic radical on the *left* (Feldman & Siok 1997: 779). The reader is thus guided, through *place-value*, in the majority of cases, towards searching for a *meaning* for the character, and will expect to find the majority of such indicators on the left. In other words, the *position* of an element in a character can be a guide to the *function* of that element in the character. This principle may be extended to RC both at the level of the character (though there is no need for a phonetic element) and at the level of the proposition (see section 12.2).

(16) Proposed metarule No. 11
RC characters may use a *radical*, a.k.a. a *signific*, the form of which remains to be determined, as a guide to the meaning of the symbol.

Having established some possible metarules for the formation of characters, we shall now examine the question of how such characters might be combined so as to show their grammatical relationships to one another.

12. Syntax in RC

While having the preferred order SOV, the highly inflected Latin language had virtually free word order (allowance being made for the placing of conjunctions, prepositions, and so on in the appropriate position to permit the construction of clauses, prepositional phrases, and so on). Case endings and verbal terminations demonstrated the function of each element in the sentence whatever the order in which the words were presented. Similarly, in German, whether one writes *Der Mann liebt die Frau* or *Die Frau liebt der Mann*, the fact that 'der' is both masculine and nominative shows that both sentences mean *The man loves the woman* and not *The woman loves the man.*

Languages which lack pointers such as indications of case may depend on word-order to show the reader the functions of the various constituents. In English, the noun to the left of the verb is usually taken to be the subject (or topic, agent, and so on, depending on one's grammatical analysis). Comrie (1981) points out the difficulty of defining 'subject' as a language universal, in part because surface structure forms may vary depending on the verb in the sentence, e.g., whether it is transitive or intransitive.

Of the six possible combinations of Subject-Verb-Object, only

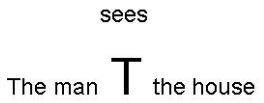
five are commonly found in the world's languages (Comrie 1981). Over 75% use the order SVO or SOV. Some 10-15% use VSO; a few, mainly belonging to the Carib family, use OVS and a small number use OSV (Crystal 1987: 98).

A pasigraphy such as RC must find a way to represent the syntax of the sentence, such that the sentential functions of the symbolic elements may be analysed and calculated by any reader, whatever their native language, and such that messages may be composed with a recognisable syntactic structure. It would be undesirable to set out *a priori* rules, e.g., 'The leftmost symbol in linear presentation is the subject of the sentence,' since languages such as Arabic, Hebrew, and so on are read from right to left. The rule cited here as an example would impose an unnatural choice of word order for readers of these and other languages with similar writing conventions.

If, however, linear ordering is abandoned and a system of *place-value* is adopted instead, the basic structure of a Subject-Verb-Complement sentence may be represented visually. Note that Complement is taken in its literal sense of 'that which completes,' and may thus be Object (*The man saw the house*), Adjective (*He was tall*), Nominal Complement (*They made him king*), or Clause (*I believe that you are right*) or even a prepositional phrase functioning in an adverbial fashion (*I went to town*). By placing the elements in a triangle, or on a T-shaped bar, the function of each element is determined by its *position* in the sentence. The verb, or predicator, is placed above the T-bar. The subject (topic, agent, and so on) is placed to the left, and the complement to the right. The *function* of a syntactic element thus becomes *visible*, and the sentence may be read *in the order of one's native language.*

Thus, a positive, active-voice statement such as *The man sees the house* may be diagrammed as follows:

Figure 1. T-Bar Presentation



This is essentially a more visual form of the style of presenting two-place propositions in predicate logic as: F[x, y], where the predicator lies outside the brackets and the two arguments lie within.

In the absence of fully worked-out RC characters, let us use the following: ⊽ = *man*; Θ = *see;* Δ = *house*. Using these temporary draft versions of RC characters, the above sentence (with no tense marker) may become:

Figure 2. T-Bar Presentation with Draft RC Characters

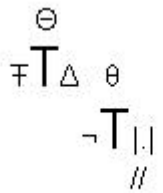
The formerly-linear sentence involving 18 characters (letters) is now compressed into a single unit using only three. It thus becomes 'the sentence-as-character,' in which the structural and semantic relationships between the constituent parts are illustrated visually in a single unit occupying minimal visual space. Moreover, this conforms with much of what Wittgenstein (1922) has to say in his 'picture theory' of propositions in section 4 of the *Tractatus*, e.g., 4.022: 'A proposition *shows* its sense'; 4.032: 'It is only in so far as a proposition is logically articulated that it is a picture of a situation.'

The display represents the basic Subject-Verb-Complement

(S-V-C) of a sentence, not in linear order as in ordinary written language, but in a visual and propositional triangle of symbols which can thus be read in any direction, according to the order in one's own language, e.g., S-V-C for English, V-S-C for Welsh, or S-C-V for Japanese. A deaf reader used to British Sign Language might read the message in the order C-S-V, as BSL uses a topic-comment structure.

Subordination may be handled in a similar way. If θ = *be*; |·| = *in*, // = *street*, and ¬ = 'clausal link' or relative pronoun, then, *The man sees the house (which) is in the street* may be represented as:

Figure 3. T-Bar Presentation with Subordination



Meaning: 'The man sees the house (which) is in the street.'

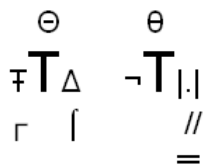
A reader of German, knowing the syntax of that language with verb-final in a subordinate clause, will read the first proposition as SVC (*Der Mann* | *sieht* | *das Haus*) and the second as SCV ((*das*) | *in der Straße* | *ist*). A Turkish reader would read the proposition in a different order, taking the subject first, followed by the relative clause, the object, and then the verb. Within the relative clause, 'street' as a locative precedes 'be located': 'Adam [man] cadde-de [street + locative] balun-an [be.located + participle] ev-i [house + accusative case] gör üyor [sees: present tense/3rd person singular].'

An Arabic reader takes the proposition in the same order as English, but the relative clausal link and the verb are read as one

element, ‘elethi’: ‘Arrajulu [the man] yara [sees] almanzila [the house] ellethi [which is] fi aasharii [in the street].’ For a Finnish speaker, the symbols for ‘in the street’ may be read in the reverse order, treating the preposition as a case ending, namely the inessive case, used for ‘in.’

This brings us to the question of the word-order of other elements in RC. For instance, since a pasigraphy must be, to all intents and purposes, language-neutral, it is necessary to resolve the problems caused by the fact that some languages, e.g., English, German, and Chinese place attributive adjectives before the noun, whereas languages such as Welsh and French normally place such adjectives after the noun (both languages have some exceptions). The provisional solution for RC is to place the adjective *below* the noun, such that the noun phrase may be read in either order, according to one’s native language. Thus, if ‘ ⌠ ’ is our provisional RC character for *tall*, ‘ ┌ ’ the character for *small*, and ‘ ═ ’ the character for *long*, the above sample sentence, using ¬ as the link (and using a linear order for simplicity) may be modified to:

Figure 4. Presentation of Adjectival Modification



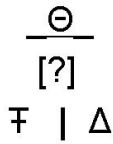
Meaning: ‘The small man sees the tall house which is in the long street.’

To facilitate ease of reading, each clause may be reduced into a uniform square, as characters are in Korean, with adjustments of size of elements for aesthetic reasons, thus producing a clear and cohesive design.

13. Speech Acts

The syntax dealt with thus far deals only with positive statements. If such propositions are regarded as the unmarked functional form, then it will be necessary to *mark* other forms of *speech act* (Searle 1969) such as question, exclamation, and imperative. It is proposed that such illocutionary acts be marked *within* the T-bar. Thus [?] is used to mark a question, [!] an exclamation, and [!!] an imperative. Using this notation, *Does* [Aux] *the man* | *see* | *the house?* (or *Sieht* | *der Mann* | *das Haus?* (German); *Est-ce que* [?] *l'homme* | *voit* | *la maison?* (French); *Ydy'r* [Aux] | *dyn* | *'n gweld* | *y ty?* (Welsh), and so on) is represented thus:

Figure 5. Presentation of Speech-Act Indicator



Meaning: 'Does the man see the house?'

However, the accumulation of symbolic elements such as speech act markers, adjectives, relative clauses, and so on counteracts the simplicity of the original 'sentence-as-character' concept. Given that the computer is not bound by static presentation, this problem will be resolved by Rapid Serial Visual Presentation.

14. Rapid Serial Visual Presentation

Rapid Serial Visual Presentation (RSVP) is a means of presenting visual material such as letters or words in a non-linear

fashion, using the affordances of the computer. Single visual elements of the chosen variety are flashed individually before the reader with extremely short intervals between each element. Proximity of presentation allows the stream to be seen as a continuous visual and cognitive whole, rather than a series of individual points. A fluent reader normally reads printed text at about 200-300 w.p.m. and can scan text for information at about 600 w.p.m. (Grabe 2009: 289). However, Öquist & Goldstein (2002) found that reading speeds for short texts were 33% faster using RSVP than those of normal linear-reading activity.

The human eye does not read in a smooth, uninterrupted flow. Rather, the eye jerks across the page in jumps, known as *saccades* (French for *jolts*), focusing on words, sections of words, or groups of words in periods known as *fixations* between the saccades. During a saccade, little information can be obtained, as the eye must be still, so that the *fovea centralis* can focus. It is during fixations that information can reach the mind-brain.

At less than 200-300 w.p.m, the mind-brain loses the sense of what it has read, failing to store meaning while it processes further sections of text (Grabe 2009). RSVP removes the need for the eye to make saccades, requiring only fixations, as the information is presented in a narrow focal area in the visual field each time. With presentation of individual letters or words high speed, the time required to scan in a normal fixation is reduced. Processing and identification of letters or comprehension of words or phrases are thus achieved far more rapidly, although some information may be lost (Nieuwenstein & Potter 2006).

Further research would be required to determine optimum conditions for the presentation of RC characters and the intervals required for the reader's attention to focus on the next-presented functional location, e.g., Subject before Verb, or Object after Verb. To reduce problems of attention to RC, it will be possible for the reader to adjust the speed of emergence of RC messages on personal devices, or to record them for replay at appropriate speed.

15. A Picture Is Worth a Thousand Words

The need for illustration in some conventional linear texts demonstrates the fact that words alone may be insufficient to convey meaning. It is for this reason that technical manuals often have diagrams either in place of, or as a supplement to descriptions. The eye may see as a *gestalt* that which the mind cannot compose from linguistic input.

It is for reasons such as these that RC texts should include the possibility of multimodality. A text is never merely words. Its very layout and composition add the equivalent of what on the phonological plane are known as 'suprasegmentals.' 'What?' and 'What!' are not the same text, either sonically or visually. Additional information is conveyed by tone on the one plane and punctuation on the other. Similarly, the illustrated text is not identical to the same words which lack the accompanying picture and associated layout. 'We went to Mount Fujiyama' as a text is less informative than the same words with an accompanying photo of the message-sender at the site in question.

The question of conveying the idea of colours through words is also resolved in computer presentation. The spectrum is not divided in the same way in every language (Berlin & Kay 1969, Leech 1974). However, by incorporating instances of actual colour in RC through the use of a palette of colours such as is used in PowerPoint, there is no need to insert colour words into an RC text—the question of whether a car is to be described as 'light blue' or 'dark blue' (two shades in English, two separate colours in Russian) does not arise, as the vehicle may be portrayed in the appropriate colour/shade, or a colour 'chip' or spot may be added to show the writer's intended meaning.

The use of colour to indicate meaning may also be part of the functionality of RC. Possibilities for its use include coding for tense (though not all languages show tense, and some have tenses

lacking in others) and linking pronouns and other expressions to their referent noun by the use of the same colour (e.g., 'John . . . the small boy . . . he . . . him . . . ,' and so on). Horton (1994) demonstrates how colour may be used to heighten the effect of meaning, e.g., brown may equate to solidity or earthiness. Cultural factors, may of course, enter here. Black is often the colour used to represent death in the West, white in the East.

16. Computer Affordances

Electronic communication allows texts to appear not merely as static objects, but as moving, animated events, such as flowing TV news banners, pictures that move, jump, jerk, blink on and off, and so on. It is computer-affordances such as these which lend to RC possibilities which did not exist for its historical predecessors.

Egyptian hieroglyphs used a picture of walking legs to signify 'to walk' or 'to go,' but the illustration itself was, of course, static, being written on papyrus or painted on a wall. In the computer age, whether the symbol ultimately chosen for RC is a picture of walking legs or merely a dotted arrow (⇢), the virtuality of the symbol allows movement to be programmed into the character, thus lending a double layer of meaning (symbol with meaning + illustrative animation). Such a facility will apply particularly to action verbs in which particular animation effects applied to written symbols will be appropriate, e.g., 'emerge' represented by "iris in," 'disappear' by "iris out," 'fade' by "dissolve," 'blink' by "flash," and so on.

Three-dimensional representation may be used not merely to show solidity of objects, or perspective, but combined with animation may be used to show expansion and contraction or movement towards or away from the 'speaker.' CGI in films and computer games has now reached a level of sophistication which

would enable it to convey an almost filmic quality of representation in RC.

17. Technological Implementation

The above arguments may present a reasonably coherent attempt to justify the need for a Real Character in the computer age and to suggest how such an RC might begin to be created. These arguments say nothing, however, of the technological means by which such a pasigraphy would be built up within a program for a computer or a hand-held device, nor of how such messages would be encoded, sent, received, and decoded.

The example of Chinese text-messaging may serve as starting point. To send an SMS text, the writer's message is typed in Pinyin (romanized letters). A choice of characters is displayed, and the correct one is chosen according to the meaning intended, e.g., 'ma' in Mandarin has four different meanings, and the appropriate character must be selected. The sentences of the text are built up character by character and then sent. This principle would be the foundation of messaging in RC. A vocabulary (or ontology) of RC characters would be assumed to be saved within the computer's memory and the typing in of a word in the sender's native language would produce a choice of characters, as in Chinese, e.g., there would be different characters for 'bank,' depending on whether the intended meaning was 'money store (noun),' 'to put money in a money store (verb),' 'edge of a river (noun)' or 'to turn sharply in the air (verb).'

Initially, messages would be short, just as Twitter is confined to 140 characters. As the technology develops it would become necessary to employ what Kaku (2008) describes as a 'constructional approach,' i.e., one tries out various approaches to building the system and sees which one functions best, regardless

of theory. This will certainly apply when it comes to the construction of a system to represent sentential syntax. However, RC does not use linear syntax (see section 12), and most people lack the theoretical knowledge to divide sentences into elements according to their syntactic functions. A computer or phone might therefore display the most frequent verbs in the source language (+ 'Other') over the T-bar for the writer to make a choice or to type in a word, with a similar menu for the speech-act slot (probably divided into 'Statement,' 'Question,' and 'Other'). Conversion software would then select possible RC characters from which the writer might choose, as in Chinese texting. A similar menu might exist for Subject, containing pronouns such as 'I' and 'you' and semantic primes such as 'Someone' and 'People,' with the possibility of 'Other' always being available. At a more advanced state of development, voice-activated software would act in a similar way, once the source language was specified.

Static, printed text, however, has one advantage over RSVP, in that the whole text is constantly available, and the eye may regress over sentences or even whole paragraphs if the reader loses track of meaning. To counteract this problem, the screen presentation for the recipient of an RSVP text in RC would include in a side-bar on the screen the text thus far created in a message, together with the facility to scroll back. If one wished to scroll forward in a text which already existed as a whole, the same facility would enable this to be done.

18. Conclusions

The Information Age is also the age of internationality and globalisation. The need for rapid communication in an epoch of electronic communication is overwhelming, but speed of

transmission is nothing without speed of comprehension. While on-line translation from one language into another makes constant progress, it is as yet comparatively crude and inefficient, and translation agencies still require human translators.

Many a sincere linguist has awoken into cold reality from the dream of an international language such as Esperanto. Okrent's (2009) 'land of invented languages' is peopled with the products both of professional linguists and of those who might be described as 'on the lunatic fringe.' Their general error has been to attempt to devise a new language, complete with its own vocabulary (often weird or Eurocentric) and simplified syntax. An RC as outlined here, however, attempts to provide a pasigraphy, a 'read-only' version of whatever one's native language is, readable by speakers of that or other languages, without strange or invented words.

Questions still remain. Using RC T-bar syntax, for instance, how would one convey to a Hopi reader 'There was a flash of light,' when 'flash' is an event in Hopi, not a thing? How does one convey to a Chinese speaker 'My brother went to town,' without specifying whether it was an elder or a younger brother, as is required in that language? The Nootka language demands a form resembling 'It stoned down' rather than 'A stone fell.' Would this be better handled by animation than by T-bar syntax? How would one deal with a language such as Spanish, in which a pronominal subject is not shown, e.g., '*Voy*' = 'I go'? Should tense and/or aspect be marked (perhaps above the verb), given that tense is not indicated in many languages? How is the case of WH-questions in English to be dealt with? For instance, in 'When did you say that you saw Mike?,' the WH-element is understood as being attached to 'saw,' not to 'say.'

Once such problems have been solved, reading in RC will no longer be a matter of monotone, static blocks of text given to the reader as a solid, unanalysed whole. Instead, text will be an emergent event, composed of characters which themselves bear meaning because of their form, and which are combined with

coloured and animated graphics, some in 3-D, set within a syntactico-semantic frame, the whole presented serially at a rate chosen by the reader.

To conclude, a quotation from John Wilkins's (1668) *Epistle Dedicatory* from the *Essay* seems appropriate: "I am very sensible that the most useful inventions do at their first appearance make but slow progress in the World, unless helped forward by some particular advantage. . . . And there is reason enough to expect the like Fate for the design here proposed." It is, however, to be hoped that the revival of the idea of a Real Character as set out here may be a timely one as we move further into the Computer Age.

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