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ARTICLES

INSUFFICIENCY VERSUS REDUNDANCY*

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Physical separation of individuals is at variance with their social continuity and bars them from communicating the content of their thoughts without any kind of auxiliary instruments of mediation. This is the purpose of a system of material and perceivable markers associated with the ideas dwelling in the minds of people and enabling their more or less approximate transfer between the communicating individuals.

Conventionalized acoustic signalization is a fundamental necessity. Other kinds of signalization function in parallel and we regard them as complementary if archaic. Communication by means of signs bridges the physical separation of the minds of individuals dominated by the natural and inherent social instinct. This is done in an imperfect manner, which may be viewed as a special kind of noise disturbing smooth communication.

A hundred per cent satisfactory and perfect communication of ideas by means of material markers cannot be achieved because of the nonexistence of a strict delineation of the contours of the contents of human minds, but also due to their fuzzy periphery as well as to diverging individual experience of different human beings. The transfer of ideas into communicable signs endowed with meaning is a process of a discretization of the continuous content; the discretization is a consequence of the processes of abstraction, selection and synecdoche. The abstraction is involved in the choice of motivational stimuli (many of them might be of insubstantial and random nature) so as to be representative from the viewpoint of social convention. In relation to the content of the message as delivered by the sender, the meaning of the linguistic sign is synecdochical (in the sense of a pars pro toto representation), while the recipient perceives it as vague or indeterminate. The sum of linguistic signs displaying indetermi-

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nacy or vagueness (as a soft reflection of the fundamental continuity of surrounding reality) creates a specific and flexible mosaic or a "map". Such a map varies from society to society and has a specific shape in each community, in addition to this changing along the time axis and being gradually (re-)created and modified in the minds of the individuals while the individual innovations undergo either conventionalization or rejection.

The semantic noise produced by the individual deviations among the communicating persons disturbs the exchange of information. A specific level of noise is inherent not only in the intra-group communication, but (perhaps to a significantly greater amount) in the inter-group communication and in the latter case the total of deviations is also culturally determined and therefore clearly perceived as a problem of translation. Within a (linguistic) community the deviations are defined as individual while between different communities they may be due to environmental peculiarities, but first of all to culturally defined specificities (the latter are – unlike individual deviations – conventionalized). Language must have at its disposal instruments required to increase its resistance against disturbing noise, that is redundancy. Their inventory comprises upon the semantic level paraphrasing, use of synonyms, "cottonwool" expressions, questions, non-verbal signalization, repetitions etc. When translating, in extreme instances one is forced to prefer analogy, calques or at least footnotes concerning the true sense of the expression in question. Thus the Marquesan phraseological expression *huke 'i te 'umu* may be perceived either literally "to unearth the earthen umu" plus the neutral explanatory equivalent with the meaning "to revenge".

Another source of semantic noise may lie in a high measure of lexical homonymy that may cause problems during the reception of information especially if the context does not guarantee a high probability of the selection of any of the available alternatives. Context-bound elements are in fact one of the means of increasing redundancy. There are styles such as poetry, however, which support the selection of quite improbable alternatives with the purpose of bringing about a dazzling effect upon the recipient who is thus forced to think about the startling utterance. On the other hand, this effort may under different circumstances, degenerate into a purposeless and boring verbalism.

Sign is a social convention even if not a convention that arose as a consequence of purposeful and deliberate action. It may arise spontaneously and ad hoc, never being closed into itself in an effort to asymptotically approach the perfect realization of its goals. This is virtually impossible in an incessantly and quite rapidly changing modern environment. Let us take, for example such an elementary word as *mother* no doubt is. The content of this word may vary if we consider a child being brought up by its biological mother or a child adopted by a non-biological mother, not even mentioning a child that is being brought up in an orphanage. In a Polynesian society where adoption seems to have been quite common without being inevitably brought forth either by the poverty of biological parents or by their sterility, the content of the idea of mother (including its associations) would be quite different from the European idea of mother. The divergences of this type may be perceived as semantic noise during transla-

tion. Problems upon the level of abstractions are notorious and are partly of acognitive and taxonomic nature. In Polynesian languages *manu* (originally meaning bird) is also used to refer to various flying creatures with wings. Is the semantics of this word from a purely cognitive point of view indefinite despite the fact that the Polynesians find it practically adequate? This sheds light upon the flexibility of language capable of efficient adjustment. Another analogous example is the image of snake, the Biblical seducer. As is known, the shape of snake ranks among those images that are especially deeply rooted in human minds. The ancestors of Polynesians took the motif of snake as far as the eastern part of Oceania where there are no snakes at all. Its token has survived through being replaced by the sea eel (*tuna, puhi*) and the latter has been assigned similar properties in the Polynesian languages (cf. the Marquesan legend *Puhi—nui—aau—too* in Handy 1930: 78-80).

The meaning of a sign is just a modest selection of the properties of its referents and is fully realized through its actualization in the speech. In such a case the insufficiency of signalization is as a rule eliminated during the speech act though the context that is compatible only with several of the semantic shades of a word, not indiscriminately with all of them. Besides, additional nonverbal signals may be helpful, demonstrative pronouns, mimics, and also repetition, modification of the utterance and often verificative questions.

However, semantic noise is not the only circumstance that requires the presence of redundancy. Very small phonological inventories (including strict phonotactic rules) may imply a fairly low number of theoretically admissible syllables and longer morphemes; and if their length does not increase significantly, homonymy may considerably increase. Insufficient signalization may often be felt upon the level of phonetics, especially in languages displaying a meagre inventory of phonemes. This does not automatically amount to a decrease in phonetic redundancy for the reason dealt with below. A low phonetic redundancy may be attested for a language displaying a rich phonological system in which pairs of phonemes representing privative oppositions occur, that is, minimally differring – namely just in one feature, for example voiced versus voiceless stops k – g, p – b, t – d. Where the difference between two phonemes can be reduced just to a sole feature, they may become indistinguishable even if the level of noise is relatively low. This is very often perceived if such phonemes occur within the same morpheme, for example within the same word root. In the research of phonotactic structure of morphemes this may be reflected as a significantly low co-occurrence of such sounds within the morpheme (cf. phonotactics of consonants in the Polynesian languages – Krupa 1971; 1982; 36). A prototypical example of such a language is perhaps Marquesan or Hawaiian. In Polynesian languages, the inventory of consonants often does not exceed 10. At the same time, the scanty consonantal inventories go with very strict phonotactic rules which results in a low number of syllables.

It is worth mentioning that eastward of insular Southeast Asia the phonological subsystem of the Austronesian languages is increasingly simple and the climax of this simplification culminates along the eastern margin of Polynesia – in

Hawaiian, and Marquesan (cf. Krupa 1982: 18-19, 24-27). The etiology of this simplification is still awaiting its explication. The simplification of Polynesian phonology is notable for its loss of the contrast voiced – voiceless which is anyway difficult to use at a high level of noise during communication. At first glance we may be tempted to conclude that this has led to a precarious decrease of phonetic redundancy. In fact, however, the loss of a feature functionality of which is too sensitive to noise may have positive implications... the distances among the individual sounds may increase and thus become more clearly distinguishable. It seems to be of some advantage for the preservation of a certain distinctive ability of consonants to exclude such a "weak" contrast and preserve instead the contrast linked with the location of articulation (I. Taylor 1976: 153 is, however, of a different opinion).

Thus after the loss of p – b, t – d, k – g we are left with the contrasts p – t, p – k, p – m, t – n, k — ng, m – n, m – ng, p— w, t – r, k – h, p – n, p – k, etc. Would it be far-fetched to speak here of an increase of the distinctive ability of the individual consonants despite the decline of their number? From the point of view of perception (both acoustic and visual) it is the bilabials that are the most stable diachronically and thus easily distinguishable; unlike the sonant m, the stop p is pronounced without the participation of the vowel cords and without the participation of the nasal cavity while w is easy to distinguish from both of them due to rounded articulation and absence of occlusion. According to Taylor, the loss of sibilants and fricatives in Polynesian languages may be due to their relative articulatory unease (Taylor 1976: 153). The increased distinguishability of the sounds was also supported by the disappearance of the contrast between r and l as well as the replacements of t with k in Hawaiian and spoken Samoan – and probably by the disappearance of the contrast n – ? in several languages (in Hawaiian both n and ? gave n, in Samoan ? while in Tahitian ? was replaced by the glottal stop ?). This phenomenon includes the loss of final consonants (not only do they tend to occur less frequently in many languages of the world but the final position admits much fewer consonants than either initial and medial positions. It is generally thought that the alternation of consonants with vowels approaches the ideal of articulation. However, Taylor's remark that vowels are easier to pronounce than consonants and more difficult to perceive (Taylor 1976: 154), seems to be motivated by the nature of vowels in English notable for their considerable articulatory instability and acoustic tendency to get blurred.

The indeterminacy of the communicate has at least two components. The first one is indeterminacy of the sign content and the other is vulnerability of the acoustic elements (of which consists the signal as a sequence of sounds attached to a meaning) at an increased level of noise. As John Lyons puts it, the optimal measure of redundancy for a particular channel ought to be sufficient for a reconstruction of information lost as a consequence of noise (Lyons 1968: 88). The redundancy of signalization around the value of 50 % ought to be an adequate compensatory measure (cf. Taylor 1976: 181).

The problem of signalization insufficiency may surface in a different manner. Upon the graphic level it may be observed when scanning texts. Low graph-

ic redundancy is perceived as a problem when scanning a text of low quality. The reading programme may encounter such serious problems that the letters are gravely misrepresented (or misinterpreted) and perceived by the scanner as different letters or sequences of letters that are not present in the graphical system in question. It may be illustrated by the following example:

I-iadley, f□. 1 ·. 1994a. Systernaticity in connectionist language learning. Iy1i,zcl arzo I-,c{rayzsage, 9, 24 i-272.

Lladley', R. F. 199-Ih. Systcrnaticity rcvisitcd: fichly to C;hristiamscn ancl C;haterr;md Nil<lasson and Van C;elclcr. llliznl ancl Larrgzrage, 9, 431-444.

Hadley, R. F., & f-Iayw'ard, I\'I. 1994. Strong sernantic systematicity from unsuhervised connectionist learning. 'Ieclmical Report C;SS-IS 'I'R94-02 School of Computing Sc'sence, Simon Fraser Univcrsity, Burnaby, IiC.

Hagoort, P., Brown, C;., & Swaab,'I'. 1996. Lexical semantic event-re.lated potcntial effects in patients with left hemishhere le'sions and ahhasia, and hatienis with rigln hemisphere lesions without aphasia. l3rairz, l I9, O27-049.

Halford, C□. S., □Wilson, Vl. I-I., C□ray, I3.. & I'hillips, S. 1997. A neural net model for mapping hierarchically structured analogs. In I'r-oceedirzys of t1ze Fourth (;onferezzcc of the Attstralasian Cognitia'c Scierzc.e SocietV'. Deloartment of f'syehology, University of New-castle. Australia.

Halle, M. 1973. Prolegomena to a theory of word formation. Lizzgztistic Izzyztiry; 4, 3-16.

Halle, M., & itlarantz, A. 1993. I7istributed nu□rphology and thc picces of 'snflectiun. ln K. Halc □ S. J. Ke.yser (Eds.), The niew fr-onz l3uildin□ 20: Esscrl's in lzonor of Sy'lvain l3roznberKer. C;amhridge, NIA: f□'II'h 1'ress.

Halle, I□'I., & l□□lohan□m, K. P. 1985. Segmental phonology oj modern I?nglish. Lizzguistic Irzgnir□; 16, 57-116.

Hare, Ml., & Elman, J. 1992. A connectionist account of English inllectional morphology:
Evidence. from lanouage change. In Proceedings of thc: F~onrteezztlz Arzrztal (;oufcrrerzce of tlm (□onrritive Scie.mz□ Suciet)< iy'lalwah, NJ: Lrlhaum.

Ilare, lyt., I;lman., J., & 1)aughe.rty K. 1995. Default generalization in connectionist networks. 1 azzguage auzl Cogzritire F'rnce.sses. 70, GOl-C□30.

ilarris, C;. L. 1992. Understanding English past-tense formation: 'I'he shared meaning hypothesis. In F'roceedirags of tlm Fozsrteentlz Armzzrnl Cozzfererzce of tlze C:o,□nitive Science Socicto: Mlahwah, NJ: Erllrumi.

Iiartley, D. 1775/1973. Hrzrt.lej''s thc:ory of tlze z.ztrtzan nzind. NewYork: AMS I'ress.

The same text, interpreted correctly looks like this:

Hadley, R. F. 1994a. Systematicity in connectionist language learning. Mind and Language learning. Mind and Language, 9,247-272.
Hadley, R. F. 1994b. Systematicity revisited: Reply to Christiansen and Chater and Niklasson and Van Gelder, Mind and Language, 9, 431-444.
Hadley, R. F., & Hayward, M. 1994. Strong semantic systematicity from unsupervised connectionist learning. Technical Report CSS-IS TR94-02, School of Computing Science, Simon Fraser University, Burnaby, BC.
Hagoort, P., Brown, C., & Swaab, T. 1996. Lexical semantic event related potential effects in patients with left hemisphere lesions and aphasia, and patients with right hemisphere lesions without aphasia. Brain, 119, 627-649.
Halford, G. S., Wilson, W. H., Gray, B. & Phillips, S. 1997. A neural net model for mapping hierarchically structured analogs. In Proceedings of the Fourth Conference of the Australasian Cognitive Science Society. Department of Psychology, University of Newcastle. Australia.
Halle, M. 1973. Prolegomena to a theory of word formation.
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Halle, M., & Marantz, A. 1993. Distributed morphology and
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Halle, M., & Mohanan, K. P. 1985. Segmental phonology of
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Hare, M., & Elman, J. 1992. A connectionist account of English
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Hare, M., Elman, J., & Daugherty, K. 1995. Default generalization in connectionist networks. Language and Cognitive Processes, 10, 601-630.
Harris, C. L. 1992. Understanding English past-tense formation: The shared meaning hypothesis. In Proceedings of the Fourteeenth Annual Conference of the Cognitive Science Society. Mahwah, NJ: Erlbaum.
Hartley, D. 1775/1973. Hartley's theory of the human mind. New York: AMS Press.

In such a case the reconstruction of graphemes must lean on subsidiary information from other linguistic levels such as syntactic combinatorics including syntactic and semantic redundancy.

When reading, we are aware that the written text is a ready-made message without the possibility of a feedback. In such a case, the immediate help may only be granted by a more extensive and perhaps also non-verbal context.

The insufficient signalization of the Polynesian languages is made worse by orthographies introduced by individuals speaking languages phonetically very

different from any of the Polynesian languages (in many instances it was English). Underestimating the frequent occurrence, relevance or at least importance of the glottal stop is a common phenomenon and the relevance of vocalic quantity is likewise ignored in the orthography. Consistent marking of the latter is rather exceptional until today; either macron or reduplication may be used but a universal and satisfactory convention in this respect is still nonexistent. This may be due to the fact that in English (just as in French, Spanish or German) no specific markers of vocalic quantity are in use, cf. the problem of open versus closed syllables in English, and the non-existence of simple pairs of short versus long vowels. This problem may be illustrated with the notation of Marquesan words by J. Crook from the end of the 18th century, for example: *káiuwe* (i.e. *keue*) "to move, shake", *ke'e* (i.e. *ki'i*) "skin", *páhhou* (i.e. *pahu*) "drum", *wauàtéia* (i.e. *oatea*) "noon" (Highes – Fisher 1998).

The glottal stop regularly replaces Proto-East-Polynesian /r/ in both NW and SE Marquesan variants but /r/ has been preserved in a small number of words in the dialect of Taipivai (Nukuhiva) and in that of 'Ua Pou. Besides, the glottal stop replaces /k/ in SE Marquesan, cf. *'ai* < *kai* "to eat") and in a few instances also /v/, e.g. *'ahana* < *vahana* "husband" while in NW Marquesan it sometime replaces /t/, e.g. *'eitā* < *teitā* "bush". An increased occurrence of the glottal stop is part of the shift of the articulation of stops to the rear part of the oral cavity (Krupa 1972; 1982: 38-39). This may also be true of the fricatives such as the labial /f/ in Rarotongan or postdental such as /s/ in Proto-Polynesian. As is shown by Margaret Mutu in her work on the dialect of 'Ua Pou (Mutu 1999: 31-34), there is another phase leading to the loss of the glottal stop as a consonant phoneme – the compensational laryngealization of the neighbouring (usually subsequent) vowels. Mutu distinguishes so-called tense and relaxed allophones. Laryngalization is known to occur in Tuamotuan dialects (Kuki 1970: 52) and in Tahitian (Lemaître 1972) as well. It is worth mentioning that the articulation of the glottal stop is often weakened to such a degree that the unprepared ear does not perceive it (Coppenrath and Prévost 1974).

Texts of Marquesan legends collected and published by E. S. C. Handy may be used as an example of an increased insufficiency of signal in the written style (Handy 1930). Handy as a rule omits both glottal stops and vocalic quantity and sometimes excludes even the nominal prepositive particles (functioning as case markers) a, o, i, especially if they are preceded by words displaying final vowels of the same or similar quality. Handy obviously did not perceive sequences of two identical (or very similar) vowels across the boundaries of neighbouring words as geminates or long vowels. On the other hand, the elisions of nominal particles (a, o, i) practically do not occur in George Bicknell's translation of St. John's Gospel (published a few decades later on the Internet). However, P. G. Chaulet in his *Histoire Sainte* tried to mark the glottal stops in most instances, if not always correctly (Chaulet 1903).

The reduction of the phonological inventory in Marquesan (or Hawaiian, etc.), is the result of slow and gradual diachronical changes. There are instances of scanty phonological variety that has arisen quite abruptly for very different

reasons. A typical example is Japanese where by far the most important source of new meaningful units (morphemes and words) was borrowing from Chinese. Since the phonological inventory of Chinese cannot be adequately reflected in Japanese because of the latter's more modest phonological inventory, the Chinese lexical material loses through its phonetic Japanization a considerable part of its distinctive ability, which leads to such an increase of homonymity that complicates the intelligibility of spoken Japanese (in written Japanese such a problem does not arise because of the use of Chinese characters). It is especially due to the growing role of spoken Japanese (chiefly in television and radio) that homonymy has become a serious obstacle to disturbance-free communication (cf. Neverov 1982).

In Marquesan, unlike Japanese, it is the written form of language that suffers from lower redundancy because of the above mentioned shortcomings of its orthography. A comparison of spoken and written variants of Marquesan (as well as of other related Polynesian languages) leads to the conclusion that the phonetic redundancy of the latter is obviously lower than that of most European languages.

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