



## LETTER TO THE EDITOR

### On Units of Selection in Cultural Evolution

Pocklington + Best *J theor Biol* 188, 68–76 attempt to establish criteria for the identification of units of selection in the cultural system of replicating text. We believe that their conclusions are incorrect and that their whole approach is misguided for several reasons. These may be enumerated as follows:

#### 1. The Approach is Not Theory-neutral or Free from Categorical Construction

Pocklington + Best state that their identified units of selection are not categories constructed by the investigators. However, their decision to focus on word occurrence matrices, even of the sophisticated type they describe, constitutes a frank categorical construction. There is no a priori reason to believe that the word is a more likely unit of selection than more fundamental textual elements such as phonemes or lengthier constructions such as sentences or clauses. The biological metaphor of culture which they seek to explore implies that culture is an informational continuum from the most basic elements of discourse to the most elaborate world-views. The question that Pocklington + Best pose is nevertheless worthy of further consideration, and may be stated as follows: where does what we might term the nucleotide level of culture end and where does the gene level, or more appropriately in this context, the meme level, begin? However, without justification, Pocklington + Best then conjecture that words are the meme level, and choose to apply their Latent Semantic Indexing (LSI) technique to words alone. Unsurprisingly, replicating words are found. Their approach is reductionist in the sense that it attempts to reduce cultural evolution to the dynamics of replicating elements. We do not decry the study of cultural evolution, or even memetics, as such, but contend that the reductionist approach is incorrect

and inappropriate. To assert, as Pocklington + Best do, that their analysis is thus theory neutral, Pocklington + Best is therefore incorrect at the outset. Furthermore, as will be demonstrated in more detail below, it is in principle impossible to posit meaning to individual words independently of their context in language games (Wittgenstein, 1953). Analogously, in biology it is impossible to attribute meaning to individual nucleotides independently of their context in genes. Differential replication and selection of the base adenine, without consideration of the context of surrounding nucleotides, is scarcely of interest to evolutionists, but Pocklington + Best have performed precisely this kind of analysis on their cultural system. Words must be considered the nucleotide level of memetics, and not units of selection unless they form the basis of new language games (Wittgenstein, 1953).

Newsgroup (name calling), also known as (flaming), is a language game in its own right, and in which repetition plays a major part, as multiple correspondents converge on the target of their annoyance. It is not obvious that replicating words would so easily be found in, for instance, Jacobean drama; nevertheless there is a clear sense, intuitively obvious to many, in which literature, and language evolves. Pocklington + Best may have successfully detected a word repetition phenomenon, but the relevance of this to cultural evolution is doubtful. Their LSI technique could also in principle be applied to music, if it could also be deconstructed into manageable units. In many kinds of music, especially in modern pop music, repetition plays a central role. However, how much would identification of a successfully replicating element in a series of pop songs tell us about the evolution of pop music? The commercial and social pressures, in other words the selective pressures, on its production and consumption are probably of far more importance, and would

shed more light on the real and larger units of selection

## 2. The LSI Approach Would Produce Different Results in Isolating vs. Agglutinating Languages

Additionally it is doubtful if their LSI analysis could apply to languages of radically differing grammatical structure "see Robins 1958 for grammatical terminology" Truly isolating languages such as Chinese or Vietnamese would presumably constitute the best material for LSI. In these languages grammatical concepts or functions may be represented by individual words indicating for example tense or mood. Therefore in isolating languages grammar could clearly appear as a replicator. In English LSI as described by Pocklington + Best only grammatically context free individual words appear as replicators since English requires grammar to be conveyed by elaborate constructive devices rather than simply indicated by grammar words. At the other extreme agglutinating languages such as Quechua or Turkish or even to a certain extent some non-agglutinating languages such as German and Swedish which tend to form ever larger words as concatenations of smaller ones would present even greater difficulties for LSI analysis than English because not only would grammar have to be disregarded but even noun-replicators would be difficult to identify as the level of precise word repetition between texts would be considerably smaller. A highly agglutinating language such as Quechua would require its prepositions and suffixes to be trimmed and its concatenations chopped into their individual morpheme elements in order to be suitable for LSI as Pocklington + Best describe it. By contrast precise word repetition in a truly isolating language would be very high. Would this be taken to infer that a text translated from English into Turkish or Chinese or even as closely related a language as German had acquired different units of selection to the original version of the same text? Pocklington + Best process English for LSI by deleting plurals and removing small conjunctions the former since they decrease the chances of the nouns appearing as replicators and the latter since they may probably otherwise appear as the most efficient replicators. This however strips out a considerable part of the textual meaning which it is surely the goal of cultural evolution to elucidate. To use their own example if short highly repetitive words such as {is}, {a}, {the} and {not} are eliminated how are we to distinguish between {James Smith the Nazi} and {James Smith is not a Nazi}?

## 3. The Approach Cannot Differentiate Between Contrary Usages of the Individual Text Elements

The above example of {James Smith Nazi} or the contrary is the tip of a large iceberg of conceptual confusion in cultural evolution. The structure of language means that every denotative statement "that is every apparent statement of a matter of fact" can instantly be turned into its negative. Only an individual incapable of constructing a grammatical negative cannot make this step. At the most extreme level the injunction "do not think of an elephant" is bound to produce precisely the thoughts it forbids. Language is perpetually open to contradictions of this type. To take a further example quoting the religious theme that frequently appears in memetic theorising "e.g. Dawkins 1982 Lynch 1985" the phrases {Jesus saves} and {Jesus doesn't save} would both serve to generate the replicator {Jesus save} "assuming that verbs had been trimmed of suffixes and small words deleted as is recommended" despite the fact that their meanings are directly contrary.

By contrast in genetic informational systems one cannot have a negation of a gene. An individual either has a certain allele or a different one "including deletions as alleles". These are alternatives but they are not opposites in any sense of the word. Conceptual information transmitted by means of language and received by a linguistically competent individual can instantly be transformed into an infinite variety of other linguistic formations including its precise opposite. This is a peculiarity of human language resulting from the plasticity of its transformational grammar. By contrast in the behavioural wing of the memetics movement "e.g. Payne *et al.* 1977 Ficken + Popp 1984" the use of non-linguistic traits such as birdsong has no such ambiguity as an individual bird cannot transform a received song meme into the conceptual opposite of that song.

This is not merely a pedantic point as any effort towards a population memetics in humans will require some quantitative estimation of meme frequencies. Without such statistics we cannot even hope to begin. Anthropological studies have focused on customs rituals and practices "Hewlett + Cavalli-Sforza 1975 Guglielmino *et al.* 1984" which do lend themselves to quantitative analysis in much the same manner as birdsong. However where conceptual evolution as manifest in language is concerned we immediately fall into the difficulty of the implicit ambiguity of individual words and sentences the ease with which they invoke their negations in the human mind. This is not to suggest

that language is some mystical entity that falls outside of scientific evolutionary analysis\ merely that when considering it\ and the abstract conceptual evolution which it underlies\ we must step back from the nucleotide level of individual words and consider language games as wholes\ which cannot be directly negated[ There is a language game] [discuss economics]\ but no language game [discuss not! economics]\]

To take a further example\ the phrase [Napoleon died in 0710]\ is correct[ This is propagated through thousands of editions of history texts in a way that Pocklington + Best might see as supporting their theory^ history texts containing an incorrect variant would rapidly disappear from circulation[ However\ having received the correct meme\ one may use it as the basis for an infinite number of incorrect variants\ beginning with [Napoleon died in 0719]\ or [ [ 0711]\ and so on[ If one can form the correct sentence\ one can also form the incorrect ones[ Which meme does our history book reader now have< This is a point of crucial importance\ as the entire jargon of memetics revolves around phrases such as] [host A has meme X]\ or [meme Y colonises the brain of host B]\ etc[ If it is insisted that our reader has the meme which is believed\ and does not have any of the [mutant]\ memes which are disbelieved\ that only the meme to which credence is given is the one which is truly [parasitising]\ the [host]\ then we have arrived in the territory of linguistic behaviourism "Quine\ 0859# where the constitution of an individual mind is composed of an infinite series of tendencies to assent or dissent when presented with an infinite series of statements[ The memeticists who see their discipline as providing an analysis of how religions spread "religion has become something of an obsession in memetics^ Dawkins\ 0865\ 0882^ Lynch\ 0885# often focus on who [has]\ the memes of a particular religion[ These are then defined as the believers[ An apostate no longer [has]\ the meme[ However\ this will clearly not suffice as an explanation[ Both believers and apostates\ and indeed non-believers or agnostics who have studied the religion in question\ will [have]\ the memes in the sense of possessing the relevant information[ They may even pass it on\* an atheist can lecture theology[ The difference is in the credence that is given it[ If religion is about belief rather than conceptual information\ which would seem to be self-evidently true\ it cannot be explained by memetics unless memetics is constituted as linguistic behaviourism]

This\ however\ is precisely what the LSI approach does not allow[ We are none the wiser as to the exact attitude of the list subscribers to the issue of whether

James Smith is a Nazi or not[ This is not the only difference. This particular combination\ and the other one of [Japan Pearl Harbor]\ may be metaphorical\ sarcastic\ allusive\ humorous\ even literal^ it may be a verdictive\ a expositive\ a behavative\ or a commissive "Austin\ 0868# Readers are asked to excuse the linguistic philosophical jargon[ It is merely introduced to emphasise that the identification of three words as a replicator is meaningless[ NetNews postings could vary from [Japan was right to bomb Pearl Harbor]\ to [Japan didn't bomb Pearl Harbor]\ to [Japan should bomb Pearl Harbor again]\ without difference being registered in the LSI analysis[ Furthermore\ none of these statements need be seriously intended or believed by those who place them in the newsgroup[ In a similar way\ the phrase] [pearls were found in the harbor in Japan]\ would also contribute to the replicator [Japan Pearl Harbor][ It is clear that individual words are too atomistic for the position of units of selection in culture[ In addition\ homonyms may create artefacts\ to take an inelegant but particularly perplexing example] [the number of people whose skin was number after local anaesthetic]\] Although the unit is repeated\ it is wrong to consider this as a true repetition]

Pocklington + Best may seek to defend their method by pointing out that the LSI success of their individual elements is correlated at a high level with the replicative success of the postings that the elements contain[ This begs two questions\ of which the first is] how is it possible to define the progeny of one posting except by use of the [thread]\ header< Presumably individuals who subscribe to a mailing list read most\ if not all\ the messages in the list\ and therefore any subsequent posting is just as likely to be the [progeny]\ of other messages in the list\ or indeed the progeny of any other cultural element to which the list users have been exposed[ In addition\ as any reader of newsgroups will be aware\ often the content of the main message bears no resemblance to the original header[ This is generally as a result of individuals seeking the attention of potential readers by posting an irrelevant message within a popular thread\ hence the frequent requirement for a moderator to filter out irrelevant messages "although the newsgroup quoted by Pocklington + Best is not moderated# The moderator constitutes a selective pressure which may have more bearing on the success of a posting\ in terms of its [progeny]\ than any replicators contained within it]

Pocklington + Best attempt to demonstrate that their replicators exert what Dawkins calls [phenotypic power]\ that is the ability to increase the

progeny" leaving aside our previous objection to this word of whatever postings they and themselves in. To quote Dawkins (1981, p. 80) a replicator "exerts phenotypic power over its world such that its frequency increases or decreases relative to that of its alleles." Dawkins however acknowledges that it is possible to demonstrate that even nucleotides exert such a power and qualifies his definition of a unit of selection as follows "Dawkins (1981, p. 80) "it is much more useful since the nucleotide only exerts a given type of power when embedded in a large unit to treat the larger unit as exerting power and hence altering the frequency of its copies." Our emphasis. It is therefore preferable to look to larger units whenever possible since it is in larger units\* larger than nucleotides and larger than words\* that meaning, whether genetic or memetic, is more likely to be found. (Lloyd 1983, p. 021)

#### 4. Our Alternative

Memetics, when applied to human conceptual evolution rather than animal behaviour, is on the horns of a dilemma. Either it degenerates into a rather dry and sterile linguistic behaviourism where belief markers attached to information are of more importance than the information itself, or it skirts around the issue of belief states, as Pocklington + Best do, and becomes a kind of nucleotide-level bioinformatics applied to text or other cultural artefact, a statistical microsemiotics of doubtful evolutionary relevance.

The solution to the dilemma lies in the realisation that the units of selection in human linguistically transmitted information, that is in conceptual evolution as distinct from the evolution of non-linguistic behavioural or cultural traits, are entire language games (Wittgenstein 1967) rather than the linguistic elements within them. This then removes Napoleon's ambiguity as described above. One may be capable of discussing history at a passable level of competence or not, this is a trait which may be replicated to the next generation of history students, and which may evolve over time. Herodotus would seem a little odd in a modern day history tutorial, but it would still be clear which language game was under consideration. Likewise the language game considered by Pocklington + Best may be termed (NetNews chat, or discussion list posting) not dissimilar to the still extant Chinese language game of (anonymous wallposting). Like the more traditional version, NetNews may serve the function of providing political expression in repressive climates, or simply informing individuals that they are not

alone that like-minded fellows exist. Herein lies its meaning, its biological function to the extended phenotype (Dawkins 1981) and its selective advantage. This is the level to which cultural evolutionary work must address itself if units of selection are to be found.

#### 5. Memetics Must not Repeat the Errors of Logical Atomism

Nearly 89 years ago, Wittgenstein, Russell and Moore, inspired by Frege, set about developing a logical abstract language that they hoped would allow them to explain the world free from metaphysical and pseudo-scientific baggage. Their starting point was the existence of *Sachverhalten* (atomic facts) or (states of affairs). Wittgenstein (1911) It took Wittgenstein until the 1920s to realise that this atomistic approach was flawed, that the meaning of any atomic fact is entirely dependent on its context. This journey led him ultimately to language game theory (Wittgenstein 1967). Wittgenstein's biggest philosophical weakness was an inability to understand evolution, he has little if anything to say concerning Darwinism in any of his published works. An evolutionary approach to language game theory is certainly in order, and may serve to bring culture more into the evolutionary arena. Pocklington + Best, however, are in danger of repeating the earlier mistakes of Logical Atomism. Memetic nucleotides are only small component parts of the larger memes. Culture has its nucleotides but its phenotypic manifestation is complex and its units of selection are therefore large.

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