



“Kataptation” or the QWERTY-effect in language evolution

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Suppose that an archeologist of the future finds keyboards that belong to electronic computers only but not to mechanical typewriters. How could the archeologist explain the fact that only one type of key letter layout, namely the “QWERTY” layout, was available in the English speaking world? The explanation for this apparently chaotic (i.e., non-alphabetic) letter disposition is that this arrangement was designed to reduce the probability of physical clashing of metal type-bars by placing commonly used combinations of letters as far as possible from each other. This specific layout, which was only one among several other possible combinations, was then preserved even if the function for which it was originally designed had disappeared in the age of electronic keyboards (Liebowitz and Margolis, 1990). The archeologist will just not be able to explain the keyboard display because the original reasons are no longer available to observation. The theoretical point I would like to raise here is that we may face similar situations in the domain of neurolinguistics and possibly of cognitive science.

Recent studies proved that those types of grammars that are never found across languages, that is non-recursive grammars (Moro, 2011) are nevertheless attainable by the human mind, although they recruit non-language specific networks (Tettamanti et al., 2002; Musso et al., 2003; Moro, 2008). Why don't humans get better grammars or just more grammars if they are nevertheless attainable? *Mutatis mutandis*, for a cognitive scientist to explain this phenomenon may be as impossible as for our archeologist to

explain the QWERTY disposition is. The theoretical point I would like to raise here is that this state of affairs is expected on purely conceptual grounds as the opposite of what is known as “exaptation,” i.e., the persistence in a population of a trait that is modified for functional reasons different from those for which it was originally selected (Gould and Vrba, 1982). We may then call the analogous of the QWERTY effect in biology “kataptation,” i.e., the persistence in a population of a trait that survives unmodified even if the original function that the trait was selected for disappeared and *no other function* has replaced it.

Notice that kataptation may well reflect both phylogenetic and ontogenetic development. When it comes to language, phylogenetic hypotheses are extremely difficult because there is no empirical evidence of evolution of grammar (Scott-Phillips and Kirby, 2010): there is language change, of course, but this is the outcome of some degree of freedom of grammars which leaves all major properties of language structure, such as recursion, unchanged (Newmeyer, 2005; Crisma and Longobardi, 2009). As for ontogenetic factors, instead, the experimental path may be accessible: it could well be that infants may have access to only certain types of grammars for temporary reasons related to the growth of brain circuitry that disappear in adults and simply maintain them (Kaan and Swaab, 2002). In other words, the fact that adults do not change or enhance the type of grammars that are available to infants and preserve their old style “QWERTY grammars” may just be a case of kataptation: unlike

deciduous teeth nature has not provided us with deciduous grammars in the cognitive domain.

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