Kate Distin
Cultural Evolution.
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Kate Distin's new book, *Cultural Evolution*, is a follow-up to her earlier analysis of the meme concept, *The Selfish Meme: A Critical Reassessment* (Cambridge University Press 2005). In the conclusion of that book, she takes up Dawkins' idea that words may be meme conduits, and she explores the idea that representational systems (e.g., speech, signing, writing) are the cultural media of replication as is DNA in biological replication. Her new book involves three core claims. 1) Natural language (speech or signing) evolved to enhance the success of social interactions between instinctively cooperative humans through communication within the local social group, rather than as a support for individual thought or communication with strangers; artefactual languages (e.g., writing, specialized notational systems, and money) are inherited culturally and evolved to enhance the success of functional relationships with non-locals through 'interpretive unambiguity' (117). 2) The human capacity for metarepresenting information is the engine behind cultural evolution, because it allows information from two or more cultural lineages to be combined. 3) Each language can convey cultural information only if the individual is a competent user of the language.

The first section presents a definition of information, describes various information inheritance systems, and concludes with a well-articulated defense of the view that cultural evolution, like its biological counterpart, requires discrete representations. The second section treats the human pre-adaptations for natural (spoken or signed) language, showing how natural language evolved through humans' tendency to make obvious to naïve interlocutors the fact that they possess knowledge. Distin elaborates the view to which she subscribes concerning the reason why natural language evolved: for the social communicative function rather than for the conveyance and reception of unambiguous meanings. She closes the section with a discussion of how linguistic compositionality renders language learnable and on how language acquisition influences human cognition.

The section on artefactual languages presents a riveting history of how writing developed and eventually came to be used for representing language. Distin argues that as humans moved from natural to artefactual language use, the priority changed from communicating with conspecifics quickly and easily, to more clearly serving the needs of interpreters (e.g., linguistic accuracy). But each artefactual language evolves to represent some particular area of culture and therefore limits its user to those circumscribed ways of speaking. Writing, for example, offers 'greater precision and accuracy than is normal in everyday speech, greater persistence, greater capacity, physical detachment from the humans who produce it' (103) and reciprocally influences natural language. Finally, her discussion of money as an artefactual language allows her to support the claim that

artefactual languages are excellent media for use in functional relationships, in which one person needs the assistance or specialized skill of another, but with whom she or he does not want to maintain a future social relationship. In the shortest section, she argues that all humans are genetically endowed with a metarepresentational ability, an understanding of representations of representations, and that those who do this very well spur cultural evolution. In the last section, she addresses the effect of physical environment on the evolution of languages, and concludes with discussions of technological evolution and the phylogenies exhibited by cultural products.

There are a number of positive aspects of this book. Foremost is Distin's clear exposition of her ideas, evident in both this book and her earlier book on memetics; and, in the context of contributions incorporated from an impressive number of fields, this would seem no easy feat. The organization of the sections and chapters is very sensible, and a good number of the citations are from the very latest research in linguistics, memetics, and biological and cultural evolutionary theory. However, there are two areas which are problematic. Her framing of the claim that culturally-evolved language and biological DNA share important properties is very biased toward one side of the debate concerning the way in which compositionality emerges in language. She relies on the claims that languages contain within themselves instructions for their own replication (Kirby, 'The Evolution of Language', in Dunbar & Barrett, eds., *Oxford Handbook of Evolutionary Psychology*, Oxford University Press 2007) and that poverty of the input is not an impediment to, but a catalyst for, language learning. This deficit in the input provides a necessary bottleneck between the large number of symbols accrued by each generation of speakers and the number of individual symbols retainable by the new generation (Brighton & Kirby, 'The Survival of the Smallest: Stability Conditions for the Cultural Evolution of Compositional Language', in Kelemen & Sosik, eds., *Proceedings of the European Conference on Artificial Life (ECALoi),* Springer 2001). Among language learners who can engage in both rote-learning and extraction of rules, evolutionary pressures will produce languages that are compositional, because reliance on a constrained number of language analytical rules is more economical than individual retention of each symbol (Hurford, 'Why Synonymy is Rare: Fitness is in the Speaker', in Banzhaf, Christaller, Dittrich, Kim & Ziegler, eds., *Advances in Artificial Life: Proceedings of the 7th European Conference on Artificial Life (ECAL), Lecture Notes in Artificial Intelligence*, Springer 2003).

A competing view, which Distin does not engage but that is well supported by decades of empirical work, holds that children tend to analyze language (i.e., behave as if they have the concept of compositionality) according to a 'needs-only' model (Wray, *Formulaic Language and the Lexicon*, Cambridge University Press 2002, 130 [hereafter 'Wray 2002']). Formulaic 'sequences' that are 'stored and retrieved whole from memory' may thus remain unanalyzed indefinitely (Wray 2002, 9; cf. Peters, 'Units of Language Acquisition', Cambridge University Press 1983). 'The response is dynamic and specific, not governed by any general principle that all language must be pulled apart just because it is there' (Wray 2002, 13). Indeed, empirical work shows that native adult speakers do not necessarily have full compositionality (Fairman, '"Riting these fu lines": English Overseers' Correspondence 1800-1835', *Verslagen en Mededelingen (Koninklijke*

Academic voor Nederlandse Taal-en Letterkunde 3 [2002], 557-73); and caregiver qualities apart from number of symbols shared with the child can affect the child's linguistic analysis (Nelson, 'Individual Differences in Language Development: Implications for Development and Language', *Developmental Psychology* 17 [1981], 170-87). Thus in an ecologically valid context, there is no bottleneck. Wray and Grace ('The Consequences of Talking to Strangers: Evolutionary Corollaries of Socio-Cultural Influences on Linguistic Form', *Lingua* 117 [2007], 543-78 [hereafter 'Wray and Grace (2007)'], 570) cite Kirby's simulation work showing that unless compositionality is required by the initial parameters in the modeling, 'it will stop short of fully rationalising patterns in the input, leaving islands of non-compositional material' (cf. Kirby, 'Spontaneous Evolution of Linguistic Structure: An Iterated Learning Model of the Emergence of Regularity and Irregularity', *IEEE Journal of Evolutionary Computation* 5(2) [2001], 102-10). Further, Wray and Grace (2007) argue that early hominin language would have been extremely formulaic and elliptical within a single linguistic culture, but would have met cultural evolutionary pressure to analyze when encountering a group speaking a different language. All of this suggests that a natural language does not carry within it the means of its own analysis, and is thus not really like cultural DNA. In a sense, though, these objections are not necessary, as Distin hedges in a rather complete fashion at chapter's end: 'Natural language is, in this respect, beautifully analogous to DNA, for it provides—*to receivers with the innate disposition to receive it*—its own means of replication and interpretation' (77, my italics). So, language doesn't need to resemble DNA in any comprehensive way after all.

A second problem pertains to Distin's treatment of the relationships between metarepresentational skill, giftedness, and cultural creativity. Metarepresentation is variably defined as 'pattern recognition' (170), 'the ability to make and learn connections' (171), 'to reflect on the connection between a representation and the information that it represents' (86), and 'a representation of another representation' (86). Only the last is accurate, and it is this meaning that is connected to skill in decoupling and the awareness of possible perspectives on a problem, which is a component of general intelligence. Distin argues that it is the gifted among us—defined in the psychometric literature as those who score in the top 5% of the group tested on general intelligence in one testing period—who are particularly capable of creating something new that then changes the cultural landscape. However, a recent meta-analysis showed only small to moderate correlations between intelligence and creativity (Kim, 'Can Only Intelligent People be Creative? A Meta-analysis', *Journal of Secondary Gifted Education* 16 [2005], 57-66). Another study showed that intelligence accounts for only about 3% of the variance in creativity, once processing speed has been accounted for (Preckel, Holling, and Wiese, 'Relationship of Intelligence and Creativity in Gifted and Non-gifted Students: An Investigation of Threshold Theory', *Personality and Individual Differences,* 40 [2006], 159-70). Further, tests of general intelligence measure only one's *ability* to engage in the kind of decoupling operations linked to metarepresentation, not one's *tendency* to do so (Stanovich, *What Intelligence Tests Miss: The Psychology of Rational Thought*, New Haven: Yale University Press 2009). Distin does address this distinction in her discussion of how education might enhance the tendency to use one's metarepresentational capacity, citing work that shows that people high in general

intelligence do better at avoiding myside bias when *cued* to do so (Toplak and Stanovich, 'Associations between Myside Bias on an Informal Reasoning Task and Amount of Post-secondary Education', *Applied Cognitive Psychology* 17 [2003], 851-60). However, she does not address the question of who, then, is going to be cueing the gifted people to provide the bright ideas that will feed cultural evolution.

When psychologist Richard E. Mayer wrote the concluding chapter for a recent edited book on giftedness, he noted that, of the contributing researchers discussing the question of whether giftedness refers to one's potential or to one's achievement, the tentative consensus was: achievement ('The Scientific Study of Giftedness', in Sternberg & Davidson, eds., *Conceptions of Giftedness*, 2nd edition, Cambridge University Press 2005, 438). But even if we *could* identify ahead of time whose skills would be best to imitate, would we in fact imitate them? Philosopher Kim Sterelny thinks not ('The Evolution and Evolvability of Culture', in *Mind & Language 21* [2006]: 137-65). He argues that if we see only a small part of any 'master's' life, we are in no position to judge whether she or he is superiorly skilled or not. We would notice only skills that are *extremely* better than others. But even then, he continues, our own capacities, social position, resources and support system may not allow us to copy the master. Nor do masters necessarily tolerate copycats stealing their ideas and using them to improve their own lives. The opportunity to copy may come with a price paid either in deference or other resources. Sterelny's conclusion: one must be careful. One can only hope, then, for a benevolent gifted master both willing to spend a lot of time with the learner and not inclined to expect compensation.

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