

The Human Creative Explosion

1. Between 500,000 and 50,000 years ago, ancestors of modern humans underwent rapid evolution toward the current condition; this change has sometimes been called a creative explosion. Increase in brain size was rapid for a long period. Art began to appear on cave walls. Evolution of complex language abilities occurred.
2. We can accept all of these changes as factual, whether or not the time is exactly correct or any suggested concordance of events is accurate, because we know these things had to happen some time during human history: their consequences are evident in humans today. Fossilized brain cases indicates the timing of the acceleration of increase in brain size (fig. 1, text). The oldest cave art is dated 30-50,000 years ago.
3. Earlier in the course we considered the fact that humans began at some point to live in groups somewhat adversarial to one another, which would have to remain separate to varying degrees and for varying times in order to be thought of as "different" groups. They must have come back together repeatedly, over long periods, either amalgamating or with one or the other group overwhelming the other to one degree or another, perhaps sometimes annihilating it (otherwise, how to account for only a single species now?). We don't know when such intergroup behavior became prominent, and a potent force in evolution, but we know it happened because humans have done it across all of recorded history. Adversarial intergroup interactions could yield rapid evolution, favoring the attributes of groups that tended to win. The resulting "balance-of-power" races would provide strong selection for social unity and complex cooperativeness within groups, and social antagonism between groups.
4. Complex cooperativeness associated with intergroup aggressiveness would favor evolution of abilities to (1) learn, including anticipation, through mental scenarios, what adversaries in the same and other groups were going to do next and (2) communicate such scenarios to allies. Hence, they would favor increased brain power and language abilities, which would surely evolve together. Without intergroup competition there would be no way humans could in this fashion be their own hostile force of nature.
5. Intergroup competition would have placed a premium on brain changes that enhanced strategizing ability, partly because when the adversaries were conspecific, different groups could not outrace each other or diverge indefinitely as can different species. For the same reason there would be no end to this competitive race: whenever an increment was added to brain power, the driving force would have "caught up" again because it would be the human traits that will lose in the next round of competition and change. This race would be unending like that between, say, predator and prey. Its speed, and continuance, would depend on whether or not conflicting directions of natural selection existed that made the (mental) race too expensive.
6. Presumably, during this same period, the rise of weaponry (and tools) would have started in earnest the process of humans becoming able to diminish some of Darwin's hostile forces, as by becoming able to bring down large game more easily, build or find shelters (much time must have been spent in those caves with the walls covered with paintings). Increased muting of Darwin's hostile forces would allow the brain power race

to accelerate and continue indefinitely. It would be a process of social selection (co-evolutionary selection) paralleling the better-known sexual selection because performances and responses would be evolving together within the species.

7. As the brain evolved under these conditions, increasing amounts and numbers of kinds of learning must have become involved in behavior, including transmission of learned behaviors from one generation to the next by learning (that is, the cumulative growth of culture). As culture in this way became instituted, the rise of scenario-building would have allowed the feedback between need and novelty that sets culture apart from genetic evolution: that is, the "mutations" of culture would increasingly come from the mental scenarios of individuals (about what would be useful or fun) made into reality. The greater the extent to which this happened, the greater the proportion of such cultural "mutations" that would be beneficial, unlike genetic mutations, which tend to become increasingly deleterious because their direction and nature have causes that so far have remained independent of what their bearers are able to use. In genetic evolution the need-novelty feedback is absent.

8. Some time during or following this explosion of culture and creativity, humans evolved the ability to recognize and treat separately essentially all members of their circles of relatives, according to their ability to translate benefits into reproduction. As this ability evolved, together with other selective pressures increasing brain and behavioral complexity, humans would more or less automatically become capable of social reciprocity. At first they would engage in it with relatives, as reciprocal interactions in which the risk of coming out with a net loss would be lower because the interactants would be relatives, so that a certain expectation of genetic return would always soften the dire aspects of failure of reciprocation. But nepotism could account for all of the learning and investment tendencies that would serve social reciprocity.

9. Now we are ready to talk about the arts, and all their parallels in the luxuriance of social activities that characterize modern humans. I see this luxuriance as a realization of a potential established by all the different kinds of selection I have just described acting in concert and becoming increasingly effective. To understand how the incredible flowering of human social activities and trajectories took place, we need to be sure we understand the nature of the selection involved. So go now to Handout 39 (next page).

An Effort to Classify Sources or Kinds of Evolutionary Selection

Darwin divided selection into two kinds: natural and sexual. Thinking about the arts, however, makes me think a more detailed classification would be useful. Darwin probably cogitated on this question, because his two principal volumes were *On the Origin of Species* (1859), mostly about natural selection, and *The Descent of Man and Selection in Relation to Sex* (1871) (just sex?). He suggested that humans diverged from other species in some important regards via sexual selection. He also briefly mentioned social selection, but did not expand on its significance or explain how it differs from sexual selection. He must have recognized that selection involving nonsexual social performances and co-evolving and reciprocal responses was important too, but probably did not understand as well as he might have if he could have read Robert L. Trivers's (1971) article on social reciprocity (risky ~~both~~ ^{probably} co-evolving, role-reversible, reciprocal, social investments). Darwin saw natural selection as driven by the extrinsic hostile forces of nature. He saw sexual selection as driven by intrasexual competition between sexual rivals and intersexual choice of one sex by the other. Here is a tentative effort to classify kinds of evolutionary selection in more detail.

I. **Natural Selection** (driven by hostile forces) (0,- or +,-, referring to reproductive effects on the two parties involved: the hostile force is given first)

- A. Physical forces (0,-)
 1. Climate
 2. Weather
- B. Interspecies (+,-)
 1. Predators
 2. Parasites
- 3. Diseases
- 4. Food Shortages

that are
no feedback
they are

both
probably
based, cost
partly because
deception and
reneging
are possible in
investment-
partners

II. **Co-evolutionary Selection** (driven by co-evolution of performances and responses) (necessarily +,+ on average; in specific interactions +,- or +,+)

- A. Interspecies Mutualistic Selection
 1. Non-human (leading to mutualism)
 2. Human-driven (so-called "artificial" selection, leading to human-nonhuman mutualism)
- B. Intraspecies Mutualistic and Reciprocal Selection

1. Sexual selection

a. Non-reversible roles

- (1) intrasexual
 - (a) competition
 - (b) cooperation
- (2) intersexual
 - (a) choice
 - (b) mutualistic

b. Reversible or identical roles (evolved mutualism of hermaphrodites)

2. **Socially reciprocal selection** (reversible role selection using learned propensities to invest reciprocally)

The arts seem to fit in the very last category, meaning that the relevant heritable variations underlying the evolution that created the arts occur in special learning abilities and tendencies which allow and shape social reciprocity and use of condition-dependent (or runaway) performances in display, social competition, and choice of investment partners. Costly (therefore limited) social benefits drive both performances and judgments of performances, potentially to astonishing extremes and in unexpected directions, partly because of human ecological dominance that limits the importance of conflicting natural selection. Humans are unique both in engaging in extensive social reciprocity and in possessing the arts, each depending on capabilities apparently derived from long-term utilization of extensive, discriminative nepotism, also evidently unique to humans. Artists, s. lat., thus may gain largely because they are surrogate (and superior) scenario-builders. They dissect, modify, and reconstruct reality, and offer the results for our use in developing our own scenarios. We in turn encourage and reward artists, seeking more of their benefits. Scientists do the same things, but physical and nonhuman reality changes less often, allowing cumulative discovery, development, and combining of undeniable facts, and also reducing subjectivity and the significance of individuality of meaning, each typical of the arts.

Bell's books on
selects on and
conflicts between
different "kinds"

Summary of Co-Evolutionary Socially Reciprocal Selection Based on Condition-Dependent or Runaway Reciprocal Passing of Benefits

10. David Queller (1984) suggested a way of looking at sexual selection that I think can be expanded to explain all socially reciprocal and mutualistic selection, whether based on runaway processes or condition-dependent expressions of non-heritable variations guided by evolution of abilities to gauge and correlate phenotypic condition and cost of particular, non-heritable levels of performance.

11. Suppose one kind of organism (or one organism, or one group of organisms) finds out how to obtain costly benefits from another. If the benefits are limited, as they will be if they are costly, a competition is set up over who gets the benefit and how much. If benefit-givers are not rewarded, or are penalized for giving the benefit, they will evolve to reduce and eliminate the benefit. Darwin called this process "natural selection" and the benefit-takers the "Hostile Forces of Nature." If benefit-givers obtain a net reward for giving a benefit, they will evolve to give more of the benefits, and to do so less expensively (thereby gaining more rewards). Benefit-receivers will evolve to extract more of the benefits (and to use them more effectively), thus favoring the givers of more and greater benefits. Darwin did not give a name to this process in general, but used "sexual selection" for some parts of it: I will call it "co-evolutionary selection." The involved parties could be called "Beneficent or Mutualistic Forces of Nature".

12. At the evolutionary outset benefit-givers in a prospective mutualism or socially reciprocal system are likely to be helping relatives, whether directly or indirectly through helping a mate. The reason for this assumption is that they would not need to receive a phenotypic reward from the helped individual to continue evolving to give benefits more elaborately and effectively. Alternatively, the initiating benefit for a mutualism must often be an incidental effect of efforts to reproduce (Richard Connor's pseudo-reciprocity). Such systems include the evolved (adaptive) passing of benefits to offspring by parents, to other relatives, and to sexual partners, as well as the incidental passing of benefits to a potential partner in mutualism. They can evolve to include not only interspecific mutualism but as well all kinds of social reciprocity. A consequence will be a continuing pattern of offers, requests, investments, partnerships, coalitions, advertisements, solicitations, and paybacks. In extreme cases, as in the extensive, individualized, discriminative nepotism of humans, and in human social reciprocity (both of these systems potentially role-reversible), observer participants in the social scene gain from learning more and more about individual players and using the information to choose among them, setting up processes leading to greater and greater extremes in the nature of benefits given, the ways of using them, and -- particularly in humans -- in their numbers and diversity. The brakes on extremeness in all of these regards will depend on when natural selection on the same attributes used in co-evolution conflicts with the mutualistic or reciprocal directions of selection sufficiently to eliminate net benefits for the participants. In human social reciprocity, because of ecological dominance, there is reason to believe such brakes are greatly reduced in their significance, allowing greater extremes of elaboration of co-evolutionary changes.

13. If an environmentally varying trait being used as an indicator of overall fitness is more costly to produce in its more elaborate forms, then selectors (choosers, audiences) of performances (expressions of the trait) can be expected to demand

(favor, choose) the more extreme expressions. Performing individuals will be favored for finding ways to be elaborate less expensively. Because such less costly performances will not serve the interests of audiences so well, choosers in turn will gain from favoring even more extreme and costly expressions. In other words, more and more elaborate performances will tend to evolve, partly because any new mutations making the trait more elaborate will be saved. Also, any costly extra effort on the part of the performer to make the trait more extreme, if it continues to be associated with a successful performances, will be favored, and that variation in effort may correlated with an overall underlying higher evolutionary fitness that has a heritable basis. New ways of performing along axes of increasing difficulty may also be perceived by the chooser, and used so as to initiate new kinds of directions of races in ornaments, traits, or performances. When much or most of the genome is involved in the trait being used for assessment, the heritability that allows continuing evolutionary change is not likely to disappear, as it is in selection on a single pair of alleles or a few pairs: the more genes involved the more chances for new mutations, recombinations, and all other sources of relevant genetic variation. The preliminary results of a study of music by Mitchell Ross, reported in the text, support this suggestion because musical ability appears to represent for people a general ability useful in many different realms.

14. Humans introduce on a grand scale a special feature of social reciprocity that has given our intellectual evolutionary race its nature: longer- and longer-term investments and greater and greater willingness to invest extensively prior to returns. These tendencies can only evolve if they tend to yield greater returns than expenses. But their employment entails increasing risks. Long-term and large investment, before return is expected, provide immense opportunities for cheating, and this create an evolutionary and phenotypic race among reciprocating individuals to maximize investment under complicated risks of being duped or deserted. Only in humans is there social reciprocity that allows deception and cheating to be rampant, and therefore, as Trivers (1971) first pointed out, only in humans would there be extensive favoring of the evolution of complicated and multi-tiered potentials for detecting and responding to deceptions and cheating. Only in humans is reputation likely to be important (indirect reciprocity: Darwin 1871, Alexander 1987), and of course we often say that reputation is "everything." The process of evolving ways of learning to detect and respond to cheating, and to use reputations, is the basic reason, I believe, for the evolutionary ratchet that has created our enormous brains and our massive social cleverness. I also believe it has set the stage for the appearance and elaboration of the arts.

15. All of this suggests that one of the greatest benefits a human can receive in social life is an enhancement of mental scenario-building. Jack London said it pays to stay one idea ahead of the other fellow. This can be done by an individual through accomplishing the equivalent of looking into other peoples' minds. Many traits useful in social competition may reflect broad abilities in mental scenario-building. I suggest that artists of all kinds are surrogate scenario-builders for the rest of us.

16. Social competitions that come to involve inexpensive benefits to others tend to be temporary and are identified as fads. Other social competitions that contribute only information about the competing individual's skills or cleverness, if they involve expensive displays of competitiveness, may correlate with an individual's general social capacities and yield useful information to observers even if the competition is otherwise

irrelevant to the life interests of the observer-participants (e.g., horsemanship, boxing, sports, antique tractor pulls, and other diverse skills in innumerable competitions (Guinness Book of World Record stuff): we can compare the competitors even if we don't want to participate in the competition). The arts, however, involve expensive displays that not only contribute scenario-building benefits to observers in genres broadly useful to observers, but as well inform observers about the scenario-building and social skills of the displaying, competing artist.

17. Once scenario-building became crucial, and social competition through alliances became prevalent, the number of potential life trajectories would multiply, creating the mushroom-like effect leading to the virtually countless possible social competitions and life trajectories characteristic of human life now.

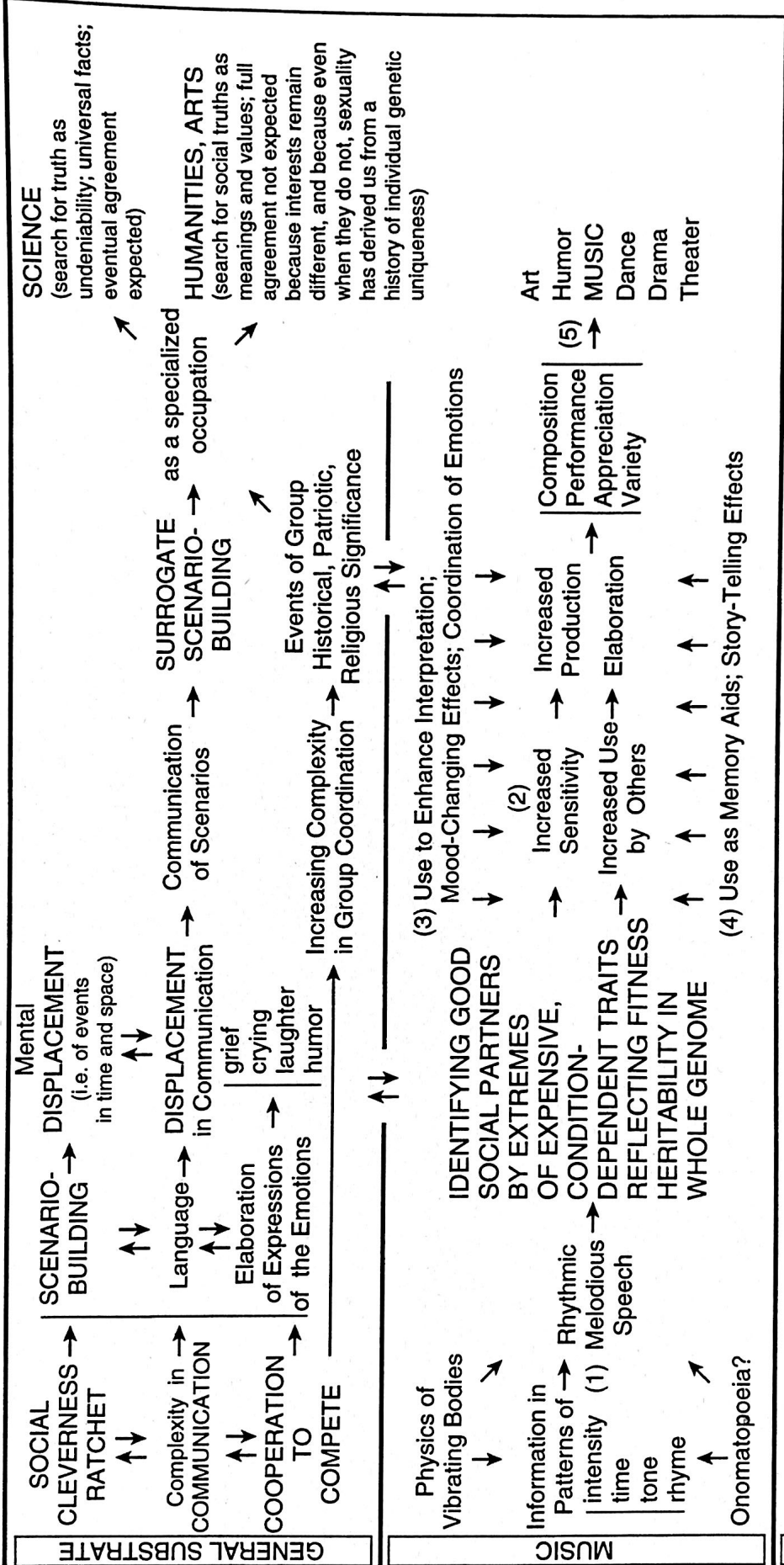
18. Changes in traits or performances would select for enhancement of one another in a reciprocating way, and if costly expressions could be judged easily by their extremeness alone traits and responses would evolve together, and virtually in any direction, to the astonishing extremes that are all around us in our social competitions and displays.

19. One also wishes to take into account that it is always securing the best and most benefits that counts, and the best and most social partners, so that there is no limit on such things: everything is relative. Social reciprocity involves enormous amounts of judgment, hence enormous effort (and skill) at causing one's self to be judged favorably.

20. Summarizing, then, to explain the human social and mental revolution (the creative explosion of some authors), one needs to return to: (1) ecological dominance and the associated muting of the hostile forces of natural selection, (2) the difference between cultural change and organic evolution, in particular how the establishment of a feedback between need and novelty could cause mutations to become steadily more likely to be beneficial, and to be more emphatically beneficial (and to speed up change), through (3) the development in the human brain through scenario-building, (4) the rise of ability to communicate about events and people removed in time and place (language), (5) the significance of multiple alliances, including those involved in group-against-group balance-of-power races, (6) the fact that group-against-group competition created the situation in which (7) social shopping and display for alliances and partnerships and such should be expected to go on continually and become steadily more important and difficult (including both identifying good social and sexual partners and making one's self appear a better partner). No other species has anything even remotely approaching the human luxuriance of different social activities and life trajectories. I think of the way these have blossomed on the modern scene as demonstrating the astonishing complexity of the human brain, which evolved in those somewhat different circumstances, which we have just discussed, that prevailed as creative explosions of evolutionary change occurred, especially that one that some 50,000 years ago.

Being able to construct a scenario of this sort is for me like finally developing an answer for the curiosity I felt as a youngster some 55 years ago, listening to the (sometimes electrifying) myths about what humans are like, how they got to be this way, and what it all means. An antidote for the depression I felt late one night in 1949 in the library of the Illinois State Normal University when I realized that philosophers have the same difficulty my parents, teachers, and preachers had: no decent theory.

Evolution of the Human Psyche and Some of its Special Activities



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