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Foresight has to pay off in the present moment[1]

Commentary on Suddendorf, T., & Corballis, M. C. (2007). The evolution of foresight: What is mental time travel, and is it unique to humans?. *Behavioral and Brain Sciences*, *30*(3), 299-312.

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Abstract:
Foresight requires not only scenarios constructed from memories, but also adequate incentive to let these scenarios compete with current rewards. This incentive probably comes from the efficacy of the scenarios in occasioning present emotions, which depends not on their accuracy per se but on their uniqueness as compared with other possible occasions for emotion.

Text

The theater analogy provided by Suddendorf & Corballis (S&C) in the target article is an apt one. Whereas a species is selected for adaptation to its environment over generations, the behaviors of an individual are selected for their reward (or entertainment) value in the here-and-now. Any policies that extend over time must compete for acceptance in the present moment, and the process that represents them in the present moment could well be described as either dramatization or time travel.[2] For nonhumans, or at least non-primates, the entertainment is of a concrete nature – mating, the hunt for food, the urge for rage – and the times traveled are on the order of seconds. As the authors note (sect. 1), longer policies have had to be genetically hardwired, in the form of urges to hoard or migrate, so as to demand no more time travel than that. The time travel process is still necessary for those species, however, and is visible in the behaviors that used to be called vicarious trial and error (Tolman 1939). Conversely, time travel is conspicuously absent in hungry animals with ablations of the ventral striatum, which will eat food that is next to them but not walk even a few inches to get it (Berridge & Robinson 1998). Even a rat needs some form of imagination.

As scenario-writing extends further into the future, it encounters a design problem: how

to interest the present agent in long-deferred prospects. The single-digit annual discount rates that are adequate to sell people secure financial investments clearly apply only to surplus wealth – that is, wealth beyond what is needed to sustain current hedonic tone. Four-year-old children, who can metarepresent others' beliefs (sect. 4.3) and tell distances to past events (sect. 4.4) still have difficulty waiting a few minutes to get two marshmallows instead of one (Mischel & Mischel 1983). Even adults have little tolerance for the boredom of a bad lecture or getting stuck in traffic, times when our usual supply of entertainment is interrupted. Volunteer subjects will often not wait two minutes to quadruple their access to a video game (Millar & Navarick 1984) and are similarly impatient to get relief from unpleasant noise (Navarick 1982). Playwrights notoriously have to design not just a plot that develops over two hours or so, but smart dialogue that provides payoffs from minute to minute (cf. the "flip value" required of novelists). Figuratively and literally, the S&C theater model of foresight is missing a key element – the audience, the present self that chooses the most rewarding time travel available. The author, producer, and director cannot impose their scenarios on the paying public, but must compete on the basis of entertainment value. This means that a future scenario must compete with current comfort, and at a substantial discount. At the future discount rates implied by people's patience for actual discomfort, the conventional exponential formula makes the value of an experience that is even a few days away infinitesimal. The relatively high tail of hyperbolic discount curves raises the value of distant events, but still not enough for events that will happen after days to compete with events that will happen after minutes (Ainslie 2006). Time travel has to bring into the present not only the picture of future events, but also a significant share of their likely emotional impact.

In effect, the discounted value of distant scenarios has to be amplified if they are to compete with scenarios that are at hand. The most likely mechanism is emotion. Strong feelings can be occasioned by stories, sometimes by mere symbols; and, as social constructionists have long pointed out, such "texts" are highly manipulable. However, the very flexibility of emotion creates the problem of separating useful amplification from noise. To say that actively constructed "episodes" are prone to error (sect. 5) is a great understatement. When evolution gives individuals arbitrary access to reward, it creates a design problem even in nonhuman animals: Dogs copulate with knees, for instance, and monkeys masturbate copiously, diverting sexual reward from its adaptive function. In imaginative humans the potential scope of the self-reward problem is illustrated by the powers of the fantasy-prone, the 1% or 2% of the population who are reported to enjoy imagining food as much as eating it, and to reach orgasm without physical stimulation (Rhue & Lynn 1987). Lacking the usual habituation of their fantasies, these people report great difficulty in pursuing tasks without distraction. They demonstrate a factor that may have limited the evolution of intelligence: the concomitant ability to suborn reward from its adaptive purposes. [3] For brain power not to mainly produce more efficient autists, something has to make emotions at least roughly model the distant scenarios that they are to amplify.

I have argued elsewhere that the crucial factor is the uniqueness of the occasions presented by these scenarios (Ainslie 2001, pp. 175–86). Trying to maximize prospective reward in distant scenarios becomes a game for present entertainment, which is how

winning immediate coupons for merchandise to be delivered later can excite the brain as if it were a visceral reward (see, e.g., McClure et al. 2004). Scenarios that have unique criteria for winning or losing – determination by someone else, reality testing that stands up to varied approaches, a single long-held belief, and so on – become selected because they occasion reward more effectively, that is, because they make the present game better. It does not matter whether the scenario is realistic per se – someone else's novel has more power than your own daydream – but the personal rules that constrain predictions to be realistic are a major source of unique scenarios. Again, it does not matter if the rules are wrong, as long as they yield unique results. A shared cultural belief about what heaven is like and who is apt to go there may generate time travel that is as competitive as science. However, sources of unique occasions other than objective predictions will obviously reduce a person's adaptiveness.

Two factors that seem to help focus the amplification process are the habituation of emotion and the preparedness to have vicarious experience. The random imaginings of fantasy-prone people habituate too little, as noted earlier. The lack of empathic readiness in autistic people not only reduces social effectiveness but may interfere with time travel to their own futures, as the authors imply. They make a suggestion for future time travel that was also made by Julian Simon (1995), and which they were able to find in Hazlitt (1805; see target article, sect. 4.3): that a person "identify with one's future self," that is, vicariously construct the experience of future selves as if of other people.

It is true that "mental time travel cannot be defined in terms of the veracity of the content" (sect. 2.1), but veracity trades off with evocativeness in the contest for audience. Just as canons of believability in theater scripts range from farce (the most evocative but least probable assumptions) through well-made (less improbable but unbelievably neat) through realistic (believable but smoothed out by conventions) to naturalistic (could be mistaken for overhearing real life), people's practices of constructing foresight could be said to fall into hedonic accounts, comparable to the budgetary "mental accounts" described by Shefrin and Thaler (1988). Mere wishful thinking can be stiffened by rules for withholding immediate gratification to make daydreaming a robust activity; the possibility of coming true, however remote, promotes a daydream into quasi-planning status – hence, arguably, the attraction of the long-shot fortunes offered by lotteries; highly believable scenarios can make up for low evocativeness by their uniqueness; and certainty commits you to the discipline of "fact," even when an observer would call it delusion. As the authors say, the emergence of mental time travel has been a crucial step in evolution, but the choice among hedonic accounts that it makes possible has introduced new motivational complexities that have only begun to be studied.

Notes

1. The author of this commentary is employed by a government agency, and as such this commentary is considered a work of the U. S. government and not subject to copyright within the United States.

2. Time travel may seem to be a melodramatic term for the construction of imagination

from memories, but it does capture the need for an active, and hence motivated, step, as opposed to passive perception.

3. It could be argued that this factor is still operating, since the smartest people do not have the most surviving offspring – by deliberate choice (Retherford & Sewell 1989).

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