An evolutionary perspective on nutrition and social decision making

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We were intrigued by findings reported by Strang et al. (1) that the balance of carbohydrate to protein in a breakfast preparation influenced subsequent human social decision making. Specifically, compared with a low-carbohydrate/high-protein breakfast, consumption of a high-carbohydrate/low-protein breakfast increased participants' tendency to punish violations of social norms, assessed as increased rejection rates of unfair offers in the ultimatum game. Said differently, participants that consumed more protein were more willing to tolerate being taken advantage of, an interpretation of the findings supported by the fact that among a number of biological variables measured, only increased tyrosine was found to mediate the effect of breakfast consumption on subsequent behavior in response to social norm violations.

We commend Strang et al. (1) for identifying tyrosine as a putative proximal biological mechanism that accounts for their behavioral findings. However, proximal explanations often leave unanswered deeper questions of why observed phenomena exist in the first place (2). In this case, the deeper question is: Why should eating protein make people more willing to be taken advantage of? In the spirit of Dobzhansky's dictum that "nothing in biology makes sense except in the light of evolution" (3), here we'd like to consider the possibility that the findings of Strang et al. (1) reflect an evolved mechanism that conferred a survival advantage across hominin evolution. We suggest that an evolutionary approach may lead to new questions that should drive future research agendas in this area.

Based on ethnographic evidence from modern hunter-gatherers and archeological evidence from ancient human groups, the need to share protein while minimizing conflict was likely more pressing across hominin evolution than any need to share more carbohydrate-rich foodstuffs, because protein frequently came in the form of kills that both allowed for—and mandated—food sharing, whereas carbohydrate-rich foodstuffs were typically obtained on a more continuous basis (4). In the context of the closely related kin groups prototypical across human evolution, we propose the hypothesis that behavioral adaptations that responded to protein consumption with a relaxed sense of tit-for-tat fairness may have enhanced individual survival and reproduction. More specifically, we suggest that when sharing large prey, this type of social tolerance may have been less metabolically costly (and hence less costly to the survival and reproduction of involved individuals) than would have been the case when sharing carbohydrate food stuffs, which typically came in smaller amounts on a more regular basis. Thus, it is possible that either protein-mediated social tolerance or carbohydrate-mediated social punishment is adaptive. Testing these adaptive hypotheses will require an ultimatum game based on food sharing itself, along with tests in groups living different lifestyles, since previous cross-cultural experiments with the ultimatum game show a high degree of variation in strategy (4). In the end, an evolutionary explanation for metabolically mediated perceptions of fairness may provide the basis for more detailed experimental interventions that alter cognition and behavior than would be available from the consideration of proximal mechanisms alone.

1 Strang S, et al. (2017) Impact of nutrition on social decision making. *Proc Natl Acad Sci USA* 114:6510–6514.
2 Tinbergen N (1963) On aims and methods of ethology. *Ethology* 20:410–433.
3 Dobzhansky T (1973) Nothing in biology makes sense except in the light of evolution. *Am Biol Teach* 35:125–129.
4 Marlowe F (2010) *The Hadza: Hunter-Gatherers of Tanzania* (Univ of California Press, Berkeley).

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