

inferences, which afford an interpretation that goes beyond the particular stimuli of the demonstration episode. In communicative demonstrations, humans use the concrete and particular to teach about the abstract and generic.

We applaud Kline's endeavor of characterizing forms of teaching through their adaptive functions. However, a comprehensive account of the adaptive problems behind teaching adaptations should recognize their relation to the types of transmitted contents. Adaptive problems in knowledge transfer arise not only because human children may lack attention or access, but critically because they often have to infer opaque contents as shared generic knowledge.

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On the persistent gray area between teaching and punishment

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Abstract: One of the challenges to a unifying framework for the study of teaching behavior will be to distinguish, if possible, between teaching by evaluative feedback and punishment.

Kline's unifying framework of teaching represents a significant advance. She proposes a broad definition of teaching as "behavior that evolved to facilitate learning in others" (target article, sect. 3, para. 1) and five typologies by which teaching occurs: (1) social tolerance, (2) opportunity provisioning, (3) stimulus or local enhancement, (4) evaluative feedback, and (5) direct active teaching. But gray areas are perhaps unavoidable. One of the challenges to an evolutionary framework for the study of teaching behavior will be to distinguish, if possible, between teaching by the fourth teaching type, evaluative feedback, and punishment.

In section 2.3, Kline cites Thornton and Raihani (2008, p. 1825), who propose three key teaching characteristics: "(1) It is a form of cooperative behavior with response-dependent fitness payoffs; (2) its function is to facilitate learning in others; and (3) it involves the coordinated interaction of a donor and receiver of information." Kline's only mention of punishment is in reference to the Thornton and Raihani (2008) definition: "A major function of these key characteristics is to distinguish teaching from other forms of social learning, communication, and social interactions like 'punishment,' which do not evolve because of the learning benefits they create for the learner" (sect. 2.3, para. 3). Kline does not describe further what punishment means, but the statement implies that teaching is something distinct from punishment. This differentiation is less clear than indicated (Kline puts the word punishment in quotation marks, which one might assume is in acknowledgement of how difficult these things are to distinguish from each other).

To get into this point a bit more: Thornton and Raihani (2008) distinguish teaching from punishment primarily through the *timing* of the fitness payoffs. They state that punishment provides immediate positive payoffs for the teacher/aggressor and immediate negative payoffs for the pupil/victim, whereas teaching, on the other hand, has delayed positive payoffs (contingent upon the learning) for both the teacher/aggressor and the pupil/victim.

When payoffs to the teacher/aggressor are delayed rather than immediate, Thornton and Raihani (2008) call this "training."

However, there are many examples that show a willingness to punish without immediate positive net payoffs for the teacher/aggressor, such as the high rates of rejection for low offers in the Ultimatum Game (Henrich et al. 2006). Perhaps Thornton and Raihani (2008) would instead classify this as "training," but a subsequent paper suggests not, and seems to self-correct their definition of punishment. Raihani et al. (2012, p. 288) write, "punishment (unlike other forms of aggression) involves immediate payoff reductions to both punisher and the target, with net benefits to punishers contingent on cheats behaving more cooperatively in future interactions." This fits the more commonly used definition of punishment (as well as seems to encompass the former notion of "training") in which the costs of punishment dramatically reduce payoffs in the short run, especially for the punisher, but not in the long run (Fehr & Gächter 2002; Gächter et al. 2008; Milinski & Rockenbach 2012); and it also means the previously drawn line between teaching and punishment gets blurrier. It is also clear that the threat of punishment can provide a benefit to the group, not just the teacher/aggressor and/or pupil/victim (Fehr & Gächter 2002; Jacquet et al. 2011).

Keeping in mind this definition of punishment, let's turn to some of the examples Kline provides of teaching by evaluative feedback, including scolding children in Fiji for touching another person's head, mildly chastising boys in the Fort Normal slave culture if they answer incorrectly about which path to travel given certain ice conditions, slapping a child's hand if she tries to touch a fire or other dangerous object, and otter mothers nipping at their young if they go ahead rather than follow. It is not clear in these cases, which all seem to have immediate negative payoffs for the pupil/victim, how teaching by evaluative feedback is functionally distinct from punishment.

Perhaps the difference is in the degree of delayed positive fitness payoffs to the pupil/victim—they might be higher in the case of teaching, which is perhaps why Kline chooses to focus on the learning benefits they create for the learner (punishment can also lead to learning, but that does not mean it should be defined as teaching, nor does it mean that learning was that punishment's main motivation). Perhaps something can be called teaching when the degree of negative evaluative feedback/punishment inflicted on the pupil/victim is less for a naïve subject than it would be for other members of the society that showed the same misbehavior. We might try to distinguish between teaching by evaluative feedback and punishment by arguing that punishment exists to maintain social order and therefore is motivated by a transgression, rather than by a desire to provide benefits to the learner. But examining the four above-mentioned examples, we would find each of these definitions still inadequate for distinguishing between teaching and punishment, which is why the gray area between the two persists and is an interesting realm for future examination.

Another way to learn about teaching: What dogs can tell us about the evolution of pedagogy

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Abstract: Kline argues that it is crucial to isolate the respective roles of teaching and learning in order to understand how pedagogy has evolved.