Abstract: Focusing on the way in which cultural variants affect other variants’ probabilities of transmission in modeling and empirical work can enrich Kline’s conceptualization of teaching. For example, the problem of communicating complex cumulative culture is an adaptive problem; teaching methods that manage transmission so that acquisition of some cultural variants increases the probability of acquiring others provide a partial solution.

Much work in anthropology exhibits – or at least assumes – a significant degree of complex harmony or coherence between elements of culture within each society (e.g., Descola 1994; Richerson et al. 1997; Smelser 1993). Whether there is as much coherence as some think, it is plausible that there are many cases in which adopting certain cultural variants affects the probability that others will be adopted (Henrich & McElreath 2003; Sperber 1996; Thagard 2012; Wimsatt & Griesemer 2007). Such transmission probability interactions (TPIs) seem likely to play an important role in cultural transmission. For example, people may be more likely to adopt a belief suggested by someone else when they notice that it can be deduced from their existing beliefs, or that it has a high degree of plausibility given what they believe. More subtle kinds of inference may affect cultural transmission as well (cf. Sperber & Wilson 1995). For example, in an article entitled “A moderate role for cognitive models in agent-based modeling of cultural change” (Abrams 2013), I suggest that cultural transmission might sometimes be biased by analogical relations between transmitted variants and existing beliefs (cf. Gentner et al. 2001; Hofstadter & Sander 2013; Holyoak & Thagard 1995; Thibodeau & Boroditsky 2013). Although the ideas underlying the concept of TPIs are not new, I will argue that a focus on TPIs as such can provide a useful enrichment to Kline’s fruitful conceptualization of
teaching types. Kline briefly discusses issues related to TPIs; for example, in her discussion of the role of relevance (Sperber & Wilson 1995) in teaching, in section 5.

The explicit use of TPIs in modeling is illustrated in a forthcoming article entitled, “Coherence, Muller’s ratchet, and the maintenance of culture” (Abrams 2015), which extends one of Enquist et al.’s (2010) models. Enquist et al.’s results imply that cultural variants that are taught only by parents to same-sex children (e.g., Tehrani & Collard 2009) would eventually disappear from a population. That result is correct when there are no TPIs, but I show that a cultural variant can be maintained by such “single parent” transmission if it can be inferred with the help of cultural variants taught by others. Earlier models that incorporate effects of interactions between cultural variants have produced significant insights (e.g., Boyd & Richerson 1985, 1987; Castro & Toro 2014; Cavalli-Sforza & Feldman 1981; Fogarty et al. 2011; McElreath et al. 2003; Mesoudi & O’Brien 2008). Those models were not formulated in terms of TPIs, but can be redescribed in terms of them. However, building models using explicit representations of TPIs is useful because real-world TPIs are rooted in cognitive processes within particular physical and cultural contexts. The concept of a TPI, therefore, provides a useful abstraction from cognitive processes involving cultural transmission, while preserving a natural mapping back to them. Sperberian attractors can also be understood as biases on probabilities of inferring internal states from transmitted representations.

Explicit focus on TPIs in empirical research would emphasize the ways in which different cultural variants affect each other’s spread. For example, experimental methods in which some cultural variants are used as primes for others, such as in the work of Dehghani et al. (2009); Kashima (2000); Mesoudi & Whiten (2004); and Thibodeau & Boroditsky (2013), could be applied in a broad range of populations. Field studies of the effects of social networks on transmission (by Atran & Medin 2008; and Henrich & Broesch 2011) might be adapted to tease out distinctions between the effects of network structure and effects of TPIs, as well. It may also possible to combine such analyses with studies of cultural phylogeny (e.g., Tehrani & Collard 2009), to argue that the presence of certain cultural variants in some, but not other, populations is likely to have been influenced by TPIs involving other cultural variants.
Fogarty et al. (2011), and Castro & Toro (2014) argue that teaching is particularly advantageous for complex cumulative culture, and that this is a reason for its prevalence among humans. In many cases involving cumulative culture, successful teaching seems to depend partly on what other cultural variants the learner has already acquired (Bransford & National Research Council 2000; Wimsatt & Griesemer 2007; Wimsatt 2014), or on the presence of appropriate environmental features produced by human niche construction (Sterelny 2012; Wimsatt & Griesemer 2007, Wimsatt 2014). Therefore, one role of teaching may be to organize the transmission of cultural variants so as to increase the chance of retention; for example, by encouraging the student to begin learning simpler or more fundamental ideas or methods before others, or by providing a supporting conceptual framework (Bransford & National Research Council 2000). In other words, some kinds of teaching can be viewed as methods for transmission probability coordination, that is, as methods for coordinating transmission of cultural variants in such a way that early acquisition of some variants increases the probability of later acquiring and retaining other variants. We can view the problem of communicating complex cumulative culture as an adaptive problem, even if it applies only to humans (Boyd et al. 2011). Transmission probability coordination then constitutes a partial solution to this problem. Its use overlaps with other methods listed by Kline, but they overlap with each other as well.

Kline suggests that direct active teaching, in particular, aids transmission of cumulative culture. Direct active teaching is the method that most obviously allows control over transmission probability coordination. However, opportunity provisioning can serve this role as well, through the choice of what experiences to provide to pupils at different stages. Evaluative feedback may also sometimes be coordinated for the same purpose, providing feedback on only those mistakes that a pupil can be expected to be able to correct. Information provided through social tolerance and stimulus enhancement is parasitic on conditions that would exist regardless, but these methods nevertheless might be used to encourage a pupil to experience only those situations that are plausibly safe or comprehensible.

Finally, teaching methods may themselves constitute instances of complex cumulative culture. Conceptualizing differences between teaching strategies in terms of
transmission probability coordination may provide a useful abstraction for understanding interactions between transmission of teaching strategies and transmission of the variants they are used to teach.

References