

# What is Tutoring? On the Nature and Origin of Human Pedagogy

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## Abstract

This chapter identifies the fundamental nature of human tutoring, more generally teaching, as a joint-attentional activity (Bruner, 1972; Tomasello, 1999) in which a relative expert, through a series of one or more deliberate communicative acts, goes out of her or his way to help a relative novice acquire some new and generally useful component of knowledge or skill. Because of its central dependence on language, I argue that tutoring has deep roots in human evolution, likely having first emerged, along with an early form of language, at least two million years ago, under pressure for an enhanced system of communication capable of better supporting cooperative foraging and transmission of critical knowledge and skill from one generation to the next. Over time, individuals whose brains and bodies made them even slightly better at using the new system for teaching and learning became better fed and better at attracting mates. The result was an evolutionary explosion that continues to shake the planet. Modern tutoring practices reflect this deep evolutionary history, combining tactics, strategies, and metastrategies specific to certain cultures and subcultures with others which may be traced back to the very beginnings of human language, and teaching through language.

**Keywords:** tutoring, teaching, human evolution, language evolution, natural pedagogy

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## References

Aiello, L. C., & Wheeler, P. (1995). The expensive-tissue hypothesis: the brain and the digestive system in human and primate evolution. *Current anthropology*, *36*, 199-221.

Atran, S., & Sperber, D. (1991). Learning without teaching: Its place in culture. In *Annual Workshop on Culture, Schooling and Psychological Development*, 4th, Jun, 1987, Tel Aviv U, Ramat Aviv, Israel. Ablex Publishing.

Arbib, M. A., Liebal, K., & Pika, S. (2008). Primate vocalization, gesture, and the evolution of human language. *Current anthropology*, *49*, 1053-1076.

Barron, B. (2006). Interest and self-sustained learning as catalysts of development: A learning ecology perspective. *Human development*, *49*(4), 193-224.

- Bloom, B. S. (1984). The 2 sigma problem: The search for methods of group instruction as effective as one-to-one tutoring. *Educational Researcher*, 13, 4-16.
- Boran, J. R. & Heimlich, S. L. (1999). Social learning in cetaceans: Hunting, hearing and hierarchies. *Symposia of the Zoological Society (London)* 73:282–307.
- Blumenshine, R. J., & Cavallo, J. A. (1992). Scavenging and human evolution. *Scientific American*, 267(4), 90-97.
- Boyer, K. E., Phillips, R., Ingram, A., Ha, E. Y., Wallis, M., Vouk, M., & Lester, J. (2011). Investigating the relationship between dialogue structure and tutoring effectiveness: a hidden Markov modeling approach. *International Journal of Artificial Intelligence in Education*, 21(1), 65–81.
- Boyette, A. H., & Hewlett, B. S. (2017a). Teaching in Hunter-Gatherers. *Review of Philosophy and Psychology*, 1-27.
- Boyette, A. H., & Hewlett, B. S. (2017b). Autonomy, equality, and teaching among Aka foragers and Ngandu farmers of the Congo Basin. *Human Nature*, 28, 289-322.
- Bruner, J. S. (1975). The ontogenesis of speech acts. *Journal of child language*, 2(01), 1-19.
- Butterworth, G. (2003). Pointing is the royal road to language for babies. *Pointing: Where language, culture, and cognition meet*, 9-33.
- Cade, W., Copeland, J. Person, N., and D’Mello, S. K. (2008). Dialogue modes in expert tutoring. In B. Woolf, E. Aimeur, R. Nkambou, & S. Lajoie (Eds.), *Proceedings of the Ninth International Conference on Intelligent Tutoring Systems* (pp. 470-479). Berlin, Heidelberg: Springer-Verlag
- Caro, T. M., & Hauser, M. D. (1992). Is there teaching in nonhuman animals?. *Quarterly Review of Biology*, 151-174.
- Chi, M. T. H., Roy, M., & Hausmann, R. G. M. (2008) Observing tutorial dialogues collaboratively: Insights about human tutoring effectiveness from vicarious learning. *Cognitive Science*, 32, 301-341.
- Chi, M.T.H., Siler, S., Yamauchi, T., Jeong, H. & Hausmann, R. (2001). Learning from human tutoring. *Cognitive Science*, 25, 471- 534.
- Clark, C. M., Snow, R. E., & Shavelson, R. J. (1976). Three experiments on learning to teach. *Journal of Teacher Education*, 27, 174-180.
- Cohen, D. K. (1990). A revolution in one classroom: The case of Mrs. Oublier. *Educational evaluation and policy analysis*, 12(3), 311-329.
- Cohen, P. A., Kulik, J. A., & Kulik, C. C. (1982). Educational outcomes of tutoring: A meta-analysis of findings. *American Educational Research Journal*, 19, 237-248.
- Collins, A. (2017). *What’s worth teaching?: Rethinking curriculum in the age of technology*. Teachers College Press.
- Collins, A., Warnock, E. H., & Passafiume, J. J. (1976). Analysis and synthesis of tutorial dialogues. *Psychology of learning and motivation: V. 9*, 9, 49.

- Corballis, M.C. 2011. *The recursive mind*. Princeton University Press.
- Csibra, G., & Gergely, G. (2009). Natural pedagogy. *Trends in cognitive sciences*, 13(4), 148-153.
- Csibra, G., & Gergely, G. (2011). Natural pedagogy as evolutionary adaptation. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 366(1567), 1149-1157.
- Dawkins, R. (1986). *The blind watchmaker: Why the evidence of evolution reveals a universe without design*. WW Norton & Company.
- Deacon, T. W. (1997). *The symbolic species: The co-evolution of language and the human brain*. WW Norton & Company.
- Demps, K., Zorondo-Rodríguez, F., García, C., & Reyes-García, V. (2012). Social learning across the life cycle: cultural knowledge acquisition for honey collection among the Jenu Kuruba, India. *Evolution and Human Behavior*, 33(5), 460-470.
- Donald, M. (1991). *Origins of the modern mind: Three stages in the evolution of culture and cognition*. Harvard University Press.
- Dunbar, R. (2016). *Human evolution*. Oxford University Press.
- Farver, J. A. M. (1999). Activity setting analysis: A model for examining the role of culture in development. Children's engagement in the world: *Sociocultural perspectives*, 99-127.
- Fitch, W. T. (2010). *The evolution of language*. Cambridge University Press.
- Franks, N. R., & Richardson, T. (2006). Teaching in tandem-running ants. *Nature*, 439(7073), 153-153.
- Frisch, Karl von. (1967) *The dance language and orientation of bees*. Cambridge, Mass.: The Belknap Press of Harvard University Press.
- Fröhlich, M., Kuchenbuch, P., Müller, G., Fruth, B., Furuichi, T., Wittig, R. M., & Pika, S. (2016). Unpeeling the layers of language: Bonobos and chimpanzees engage in cooperative turn-taking sequences. *Scientific Reports*, 6, 25887.
- Fuchs, L., Fuchs, D., Bentz, J., Phillips, N., & Hamlett, C. (1994). The nature of students' interactions during peer tutoring with and without prior training and experience. *American Educational Research Journal*, 31, 75-103.
- Garrod, S., & Pickering, M. J. (2004). Why is conversation so easy? *Trends in cognitive sciences*, 8(1), 8-11.
- Gavrilets, S. (2012). Human origins and the transition from promiscuity to pair-bonding. *Proceedings of the National Academy of Sciences*, 109(25), 9923-9928.
- Glass, M., Kim, J. H., Evens, M. W., Michael, J. A., & Rovick, A. A. (1999). Novice vs. expert tutors: A comparison of style. In MAICS-99, *Proceedings of the Tenth Midwest AI and Cognitive Science Conference* (pp. 43-49).
- Graesser, A. C., Person, N. K., & Magliano, J. P. (1995). Collaborative dialogue patterns in naturalistic one-to-one tutoring. *Applied Cognitive Psychology*, 9, 1-28.

- Gurven, M., Kaplan, H., & Gutierrez, M. (2006). How long does it take to become a proficient hunter? Implications for the evolution of extended development and long life span. *Journal of human evolution*, 51(5), 454-470.
- Hacker, D.J., & Graesser, A.C. (2007). The role of dialogue in reciprocal teaching and naturalistic tutoring. In R. Horowitz (Ed.), *Talk about text: How speech and writing interact in school learning*. Mahwah, NJ: Erlbaum.
- Harmand, S., Lewis, J. E., Feibel, C. S., Lepre, C. J., Prat, S., Lenoble, A., ... & Taylor, N. (2015). 3.3-million-year-old stone tools from Lomekwi 3, West Turkana, Kenya. *Nature*, 521(7552), 310-315.
- Hauser, M. D., Chomsky, N., & Fitch, W. T. (2002). The faculty of language: what is it, who has it, and how did it evolve? *Science*, 298(5598), 1569–1579.
- Hawkes, K., O’Connell, J. F., Jones, N. B., Alvarez, H., & Charnov, E. L. (1998). Grandmothering, menopause, and the evolution of human life histories. *Proceedings of the National Academy of Sciences*, 95(3), 1336-1339.
- Hewlett, B. S. (1991). Demography and childcare in preindustrial societies. *Journal of anthropological research*, 47(1), 1-37.
- Hewlett, B. S., & Boyette, A. H. (2012). Play in hunter-gatherers. *Evolution, early experience and human development: from research to practice and policy*. Oxford University Press, New York, 388-393.
- Hewlett, B. S., & Roulette, C. J. (2016). Teaching in hunter–gatherer infancy. *Royal Society Open Science*, 3(1), 150403.
- Hock, M., Schumaker, J., & Deshler, D. (1995). Training strategic tutors to enhance learner independence. *Journal of Developmental Education*, 19, 18-26.
- Hockett, C. F., & Hockett, C. D. (1960). The origin of speech. *Scientific American*, 203(3), 88-97.
- Hoppitt, W. J., Brown, G. R., Kendal, R., Rendell, L., Thornton, A., Webster, M. M., & Laland, K. N. (2008). Lessons from animal teaching. *Trends in Ecology & Evolution*, 23(9), 486–493.
- Immordino-Yang, M. H., & Faeth, M. (2010). The role of emotion and skilled intuition in learning. In *Mind, brain, and education: Neuroscience implications for the classroom*(pp. 69–83). Bloomington, Indiana: Solution Tree Press.
- Jacob, F. (1977). Evolution and tinkering. *Science* 196(4295), 1161-1166.
- Johnson, D.W., & Johnson, R.T. (1992). Implementing cooperative learning. *Contemporary Education*, 63(3), 173–180.
- Juel, C. (1991). Cross-age tutoring between student athletes and at-risk children. *The Reading Teacher*, 178-186.
- Kaplan, H., Hill, K., Hurtado, A. M., & Lancaster, J. (2001). The embodied capital theory of human evolution. *Reproductive ecology and human evolution*, 293-317.

- Kolodny, O., Edelman, S., & Lotem, A. (2015, July). Evolution of protolinguistic abilities as a by-product of learning to forage in structured environments. In *Proc. R. Soc. B (Vol. 282, No. 1811, p. 20150353)*. The Royal Society.
- Kuhn, T. S. (1975). *The Structure of Scientific Revolutions: 2d Ed.* University of Chicago Press.
- Laland, K. N. (2017). *Darwin's unfinished symphony: How culture made the human mind*. Princeton University Press.
- Lancy, D. F. (2010). Learning 'from nobody': The limited role of teaching in folk models of children's development. *Childhood in the Past, 3*(1), 79-106.
- Levinson, S. C. (2016). Turn-taking in human communication—origins and implications for language processing. *Trends in Cognitive Sciences, 20*(1), 6–14.
- Liebal, K., Waller, B. M., Slocombe, K. E., & Burrows, A. M. (2013). *Primate communication: a multimodal approach*. Cambridge University Press.
- Lotem, A., Halpern, J. Y., Edelman, S., & Kolodny, O. (2017). The evolution of cognitive mechanisms in response to cultural innovations. *Proceedings of the National Academy of Sciences, 114*(30), 7915-7922.
- Lovejoy, C. O. (2009). Reexamining human origins in light of *Ardipithecus ramidus*. *Science, 326*(5949), 74-74e8.
- Marlowe, F. W. (2005). Hunter-gatherers and human evolution. *Evolutionary Anthropology: Issues, News, and Reviews, 14*(2), 54-67.
- Mathes, P. G., & Fuchs, L. S. (1994). Peer tutoring in reading for students with mild disabilities: A best evidence synthesis. *School Psychology Review, 23*, 59-80.
- Matsuzawa, T. (2008). Primate foundations of human intelligence: a view of tool use in nonhuman primates and fossil hominids. In *Primate origins of human cognition and behavior* (pp. 3-25). Tokyo: Springer.
- MacDonald, K. (2007). Cross-cultural comparison of learning in human hunting. *Human Nature, 18*(4), 386-402.
- Maynard, A. E. (2002). Cultural teaching: the development of teaching skills in Maya sibling interactions. *Child Development, 73*(3), 969–982.
- Mehan, H. (1979). 'What time is it, Denise?': Asking known information questions in classroom discourse. *Theory into practice, 18*(4), 285-294.
- Menyuk, P., Liebergott, J. W., & Schultz, M. C. (2014). *Early language development in full-term and premature infants*. Psychology Press.
- Merrill, D. C., Reiser, B. J., Merrill, S. K., & Landes, S. (1995). Tutoring: Guided learning by doing. *Cognition and Instruction, 13*(3), 315-372.
- Miller, L. A., & Surlykke, A. (2001). How Some Insects Detect and Avoid Being Eaten by Bats: Tactics and Countertactics of Prey and Predator. *AIBS Bulletin, 51*(7), 570-581.

- Morgan, T. J. H., Uomini, N. T., Rendell, L. E., Chouinard-Thuly, L., Street, S. E., Lewis, H. M., ... & Whiten, A. (2015). Experimental evidence for the co-evolution of hominin tool-making teaching and language. *Nature Communications*, 6, 6029.
- Morrison, D. M., & Miller, K. B. (2017). Teaching and learning in the pleistocene: A biocultural account of human pedagogy and its implications for AIED. *International Journal of Artificial Intelligence in Education*, 1-31.
- Morrison, D. M., Nye, B., Samei, B., Datla, V. V., Kelly, C., & Rus, V. July, 2014. Building an Intelligent PAL from the Tutor. com Session Database-Phase 1: Data Mining. In *Proceedings of the 7th International Conference on Educational Data Mining*, 335-336.
- Morrison, D. M., & Rus, V. (2014). Defining the Nature of Human Pedagogical Interaction. *Design Recommendations for Intelligent Tutoring Systems: Volume 2-Instructional Management*, 2, 217.
- Morrison, D. M., Nye, B., Rus, V., Snyder, S., Boller, J., & Miller, K. (2015, June). Tutorial Dialogue Modes in a Large Corpus of Online Tutoring Transcripts. In *Artificial Intelligence in Education* (pp. 722-725). Springer International Publishing.
- Nicol, C. J., & Pope, S. J. (1996). The maternal feeding display of domestic hens is sensitive to perceived chick error. *Animal behaviour*, 52(4), 767-774.
- Odling-Smee, F. J., Laland, K. N., & Feldman, M. W. (1996). Niche construction. *American Naturalist*, 147, 641-648.
- Palincsar, A. S., & Brown, A. L. (1988). Teaching and practicing thinking skills to promote comprehension in the context of group problem solving. *Remedial and Special Education (RASE)*, 9(1), 53-59.
- Pintrich, P. R. (2003). A motivational science perspective on the role of student motivation in learning and teaching contexts. *Journal of Educational Psychology*, 95(4), 667.
- Premack, D., & Woodruff, G. (1978). Does the chimpanzee have a theory of mind?. *Behavioral and brain sciences*, 1(04), 515-526.
- Quinlan, R. J. (2008). Human pair-bonds: Evolutionary functions, ecological variation, and adaptive development. *Evolutionary Anthropology: Issues, News, and Reviews*, 17(5), 227-238.
- Raihani, N. J., & Ridley, A. R. (2008). Experimental evidence for teaching in wild pied babblers. *Animal Behaviour*, 75(1), 3-11.
- Rapaport, L. G., & Ruiz-Miranda, C. R. (2002). Tutoring in wild golden lion tamarins. *International Journal of Primatology*, 23(5), 1063-1070.
- Riley, J. R., Greggers, U., Smith, A. D., Reynolds, D. R., & Menzel, R. (2005). The flight paths of honeybees recruited by the waggle dance. *Nature*, 435(7039), 205-207.
- Rogoff, B. & Gardner, W., (1984). Adult guidance of cognitive development. In: Rogoff, B. and Lave, J., Editors, 1984. *Everyday cognition: Its development in social context*, Harvard University Press, Cambridge, MA, pp. 95-116.

- Rosenshine, B., & Meister, C. (1994). Reciprocal teaching: A review of the research. *Review of Educational Research*, 64(4), 479-530.
- Samei, B., Rus, V., Nye, B., & Morrison, D. M. 2015. Hierarchical dialogue act classification in online tutoring sessions.
- Schaafsma, S. M., Pfaff, D. W., Spunt, R. P., & Adolphs, R. (2015). Deconstructing and reconstructing theory of mind. *Trends in cognitive sciences*, 19(2), 65-72.
- Schick, K. D., Toth, N., Garufi, G., Savage-Rumbaugh, E. S., Rumbaugh, D., & Sevcik, R. (1999). Continuing investigations into the stone tool-making and tool-using capabilities of a bonobo (*Pan paniscus*). *Journal of Archaeological Science*, 26(7), 821-832.
- Shafto, M. G., & Seifert, C. M. (2015). Teacher and learner: Supervised and unsupervised learning in communities. *Behavioral and Brain Sciences*, 38.
- Shulman, L. S. (2000). Teacher development: Roles of domain expertise and pedagogical knowledge. *Journal of Applied Developmental Psychology*, 21(1), 129-135.
- Searle, J. R. (1969). *Speech acts: An essay in the philosophy of language*. Cambridge University Press.
- Shultz, S., Nelson, E., & Dunbar, R. I. (2012). Hominin cognitive evolution: identifying patterns and processes in the fossil and archaeological record. *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, 367(1599), 2130-2140.
- Slavin, R.E. (1990). *Cooperative learning: Theory, research, and practice*. New Jersey: Prentice Hall.
- Snow, C. E. (1991). The language of the mother-child relationship. In M. Woodhead, R. Carr, & P. Light (Eds.), *Becoming a person*. (pp. 195-210). New York, NY:Routledge.
- Sockol, M. D., Raichlen, D. A., & Pontzer, H. (2007). Chimpanzee locomotor energetics and the origin of human bipedalism. *Proceedings of the National Academy of Sciences*, 104(30), 12265-12269.
- Sterelny, K. (2012a). Language, gesture, skill: the co-evolutionary foundations of language. *Phil. Trans. R. Soc. B*, 367(1599), 2141-2151.
- Sterelny, K. (2012b). *The evolved apprentice*. MIT press.
- Strauss, S., Ziv, M., & Stein, A. (2002). Teaching as a natural cognition and its relations to preschoolers' developing theory of mind. *Cognitive Development*, 17(3), 1473-1487.
- Strauss, S., & Ziv, M. (2012). Teaching is a natural cognitive ability for humans. *Mind, Brain, and Education*, 6(4), 186-196.
- Stolcke, A., Ries, K., Coccaro, N., Shriberg, E., Bates, R., Jurafsky, D., ... & Meteer, M. (2000). Dialogue act modeling for automatic tagging and recognition of conversational speech. *Computational linguistics*, 26(3), 339-373.
- Tehrani, J. J., & Riede, F. (2008). Towards an archaeology of pedagogy: learning, teaching and the generation of material culture traditions. *World Archaeology*, 40(3), 316-331.

- Tharp, R., Gallimore, R. (1988). *Rousing minds to life: Teaching, learning, and schooling in social context*. New York: Cambridge University Press 10 (81): 248.
- Thornton, A., & McAuliffe, K. (2006). Teaching in wild meerkats. *Science*, 313(5784), 227-229.
- Thornton, A., & Raihani, N. J. (2008). The evolution of teaching. *Animal Behaviour*, 75(6), 1823–1836.
- Tomasello, M. (1999). *The cultural origins of human cognition*. Harvard University Press.
- Tomasello, M. (2014). *A natural history of human thinking*. Cambridge, MA: Harvard University Press.
- Tomasello, M., Carpenter, M., & Liszkowski, U. (2007). A new look at infant pointing. *Child development*, 78(3), 705-722.
- Tomasello, M., & Todd, J. (1983). Joint attention and lexical acquisition style. *First language*, 4(12), 197-211.
- Topping, K. (1996). The effectiveness of peer tutoring in further and higher education: A typology and review of the literature. *Higher Education*, 32, 321-345.
- UNESCO. (2017). *Policy paper 32: Reducing global poverty through universal primary and secondary education*. UNESCO.
- VanLehn, K. (2011). The relative effectiveness of human tutoring, intelligent tutoring systems, and other tutoring systems. *Educational Psychologist*, 46(4), 197-221.
- Van Schaik, C. P., Deaner, R. O., & Merrill, M. Y. (1999). The conditions for tool use in primates: implications for the evolution of material culture. *Journal of Human Evolution*, 36(6), 719-741.
- Whiten, A., & Erdal, D. (2012). The human socio-cognitive niche and its evolutionary origins. *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, 367(1599), 2119-2129.
- Wood, D., Bruner, J. S., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of child psychology and psychiatry*, 17(2), 89-100.
- Wubbels, T., Brekelmans, J. M. G., Mainhard, T., den Brok, P., & van Tartwijk, J. (2016). Teacher-student relationships and student achievement. In Wentzel, K. R., & Ramani, G. B. (Eds.). *Handbook of Social Influences in School Contexts: Social-Emotional, Motivation, and Cognitive Outcomes*. Routledge. 127–145.
- Young, N. M., Capellini, T. D., Roach, N. T., & Alemseged, Z. (2015). Fossil hominin shoulders support an African ape-like last common ancestor of humans and chimpanzees. *Proceedings of the National Academy of Sciences*, 112(38), 11829-11834.