THE GENDERED LESSONS OF WOMEN PRIMATOLOGISTS

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Misinformation, including deliberate *dis*information, continues to haunt our culture (NABT Position Statement, 2023). Many commentators focus on individuals who, they contend, succumb to self-delusion and conspiracy theories. Ill-equipped media consumers, they say. *Psychological deficits*. The corresponding remedy, they imagine, is to teach critical thinking skills and thereby foster intellectual independence (e.g., Dodge et al., 2020; Hofer & Sinatra, 2022). This view seems beyond question for some biology educators and so serves as this month's Sacred Bovine. My aim, here, is to debunk this widely endorsed assumption and sketch a more productive alternative. And all it takes is a little biology—which was seeded with insights from women primatologists in the mid-20th century. As the tale unfolds, it highlights many subsidiary lessons in the history of science, gender and science, and basic primate social behavior—all related ultimately to the nature of science.

○ Women Scientists & Primate Sociality

Our story begins in the 1960s. That's when many women entered the field of primatology: names that have since gained legendary status—Thelma Rowell, Shirley Strum, Phyllis Jay, Sarah Hrdy, Alison Jolly, Jane Goodall, Dian Fossey, Birutè Galdikas, Jeanne Altmann. Earlier studies of primates—by men—had focused on the dramatic and aggressive conflicts between (male) baboons. They "saw" dominance hierarchies and violent interactions, and interpreted them as determining the social organization of baboons—and, by implication, all primates. That made human male violence and patriarchy in human society seem "natural" and thus inevitable.

The women, however, saw things differently. Rowell's and Strum's baboons did not exhibit dominance hierarchies. Jay's langurs were "laid back and peaceful." Infant care was central, and females did all the social "policing." Jolly's lemurs were matriarchal. Goodall's chimpanzees reflected their familial relationships and engaged in cooperation and other informal economies of exchange. The women primatologists introduced an alternatively gendered "lens" and thereby exposed the blind spots in the earlier science (Morrell, 1993; Tang-Martinez, 2020). The male bias was now counterbalanced. The repeated relevance of gender in these cases offers a significant lesson: that *who* participates in science (with the varied outlooks they bring) can subtly influence what questions are asked, how data are interpreted, and, ultimately, *what* we know.

One of Goodall's remarkable observations (made in 1960) was that chimps use tools. (That challenged an earlier Sacred Bovine: that humans were unique in this regard—see *Sacred Bovines*, Feb. 2012.) It led to deeper consideration of chimpanzee culture. How did chimps *learn* from each other? This opened the study of *social learning* in primates. Since then, primatologists have documented

Figure 1. Social learning in primates. A chimpanzee mother teachers her infant how to use the hammer-and-anvil technique to crack hard panda nuts (image courtesy of Christophe Boesch).

how young chimps (and other primates) can learn about using tools, by observing others and copying their behaviors. Even more, adults may sometimes conspicuously *teach* others, by sharing tools, by demonstrating how to use them, and even by correcting the learner—in one instance, by reorienting the tool in the infant's hands (Figure 1) (Boesch, 1991; McGrew, 1992; Musgrave et al., 2016). Indeed, primates learn from each other in many ways. Their behavior highlights the basic skills for social learning that are part of our evolutionary heritage (Whiten & van de Waal, 2018).

○ Social Learning

Subsequent work has underscored the importance of social learning in how humans evolved. We may walk upright. We may be smart. But we are also fundamentally *social*, with many social instincts (e.g., Boehm, 1999; Henrich & Henrich, 2007). We, too, imitate what other members of our species do. We are, ironically, "copycats," or "sheep." The old expression "monkey see, monkey do" seems apt, too (we are primates, after all). Copying others facilitates social coordination and cohesion when the group must act in concert. It's also an adaptive strategy that helps the individual economize on mental effort. Thinking for yourself takes time and energy. It's sometimes easier and quicker just to trust others. This cognitive feature has been traced neurologically to what have famously become known

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as mirror neurons (deWaal & Bonnie, 2009). Namely, we seem to be pre-wired to be social imitators (Barrett, 2015; Whiten & van de Waal, 2017). Social learning has been further facilitated by the evolution of language. That's largely how culture happens.

Whom do we follow, and why? First, we tend to follow others in our immediate group. Part of that is based on availability. But we also learn to develop trust in the persons we interact with on a regular basis. Following peers also reflects the expectations of others. Social context fosters conformity. We generally want to fit in. "Get along by going along." We expect reciprocal behavior. Social relations, in many cases, are primary—more important than thinking and acting for oneself. Peer pressure is real (as students in their teens well know!). Or, perhaps, call it successful socialization?

We also tend to copy others who exhibit traits we desire for ourselves. Biologists have termed it *prestige bias* (Jiménez & Mesoudi, 2019). It should be no surprise that many people pay attention to what celebrities do—movie actors, star athletes, political leaders, business tycoons. Many strive to achieve the same status by mimicking their behavior. Mirror neurons in action, again. Reading *People* magazine and buying celebrity-endorsed products merely reflect an evolutionarily derived tendency? Perhaps that is why "influencers" on YouTube can be so influential. Yes, humans are social learners *par excellence*. Yet one may wonder whether our evolved habits are always to our advantage?

We might idealize that, objectively, we should be better off being intellectually independent. Not slaves to the group norms or to the admiration of role models. But apparently, this proves not to be the case. In the social tug of war between copycats and contrarians, copycats tend to win (Baddeley, 2018). That's been tested now in competitive simulations (Rendell et al., 2010). Economist-philosopher Herbert Simon underscored the adaptive advantages of a "docile" personality—generally, deferring to the group ethos and following, rather than leading. These individuals have keen perceptions of others' emotions. It allows them to measure the social scene swiftly, and to conform. They are quick learners. Their alacrity means that they also tend to bypass the need for proof, leaving them susceptible to social influence. But they also tend to have lots of friends and allies, and to succeed socially.

Learning a scientific perspective may confound students steeped in social learning. That is, scientists follow the slower and more arduous route of systematic investigation. They trust patient observation and empirical demonstration, discounting anecdotal testimony, authority, or even widely held assumptions. When it comes to science communication, the difference in learning orientations can pose challenges for how non-scientists regard genuine experts in the media. In a sense, the science-consumer may need to "*unlearn*" the default (and often successful) intuitions of social learning.

○ Sociality in Solving the Misinformation Challenge

All the evolved predispositions to follow others may not be ideal in the special case of learning scientific information. Acquiring trustworthy knowledge may involve departing from the norm of relying on friends or those who share our identity. Like all heuristics, social learning exhibits particular loopholes.

The dilemma is sharpened by the distribution of expertise in our culture. When we have need of specialized knowledge—because we do not have it ourselves—we must inevitably rely on others. Our access to expert information will always be indirect, through others. Socially based learning is unavoidable. Trust is inescapable.

Of course, the role of trust opens the door to deceptive mischief. "Bad actors" can feign expertise or adopt the image of success, and thereby convey disinformation that might enhance their own power, privilege, or political ideology (*Sacred Bovines*, Nov., 2012). The very possibility of misinformation is an ironic consequence of our evolutionary "skills" in social learning (O'Connor & Weatherall, 2019). Blind, unreflective copying can mislead us.

The solution, according to some (including the Next Generation Science Standards), is to learn how to think for oneself, to base conclusions directly on the evidence (again, this month's Sacred Bovine). Ironically, that strategy can go awry. A non-expert cannot detect cherry-picked data, gerrymandered statistics, or plausible but incomplete arguments. These are the domain of experts—why we need their knowledge.

Skepticism (so often associated with "scientific reasoning") gets us nowhere. To secure reliable knowledge, we must *trust* someone. So we must learn specifically *whom* to trust (and whom *not* to trust). We need to amplify and extend our "B.S.-detectors." We must shift our benchmark from prestige to expertise. Not reputation, but *credentials*. Not impressive appearance, but *experience and track record*. Not an impressionistic "wisdom of the crowd," but the *consensus of relevant experts* (see *Sacred Bovines*, May, 2012). That is, we must dissect and examine the nature of our trust, especially where science is concerned.

Here, we may profitably re-engage social learning and leverage it to our advantage. Consider an extraordinary scientific claim that pops up on social media or that you encounter haphazardly on the internet. They are often anonymous, their provenance unknown. Should you trust it? You could, of course, grind through the process of fact-checking it yourself. But who wants to invest the effort? It is so much easier to *learn from others*, to check it *socially*. You can open a new tab in your web browser and search whoever has made the claim (or perhaps the claim itself). Namely, anyone can leverage the power of the vast web against the isolated bogus claims that make the web so potentially treacherous in the first place (Wineburg et al., 2022).

One of our most powerful social learning resources is the community of scientists. In particular, they epitomize how social practices can increase the reliability of learning. That is, scientific claims are subject to peer review. Questionable claims spark counterclaims. Further evidence is sought. More experiments are done. Errors and biases are exposed and filtered out. The social learning process *in science* embodies crosschecking itself. When the bulk of relevant experts agree—when they achieve a consensus—we have about as trustworthy a conclusion as one can find anywhere (Ziman, 1968; Oreskes, 2019). Simple, but profound.

Here, the case of the women primatologists becomes important again. They were able to remedy the errors of their male colleagues largely because of their complementary gendered perspectives. New evidence emerged. Conclusions about primate sociality shifted. That exciting period in the history of primatology vividly illustrates the social dimension of science in action. Through criticism from varied points of view, coupled with observational evidence, scientists achieve reliable knowledge.

That is, the *social* practices of science are a major reason that we can trust its conclusions. That contrasts sharply with the conventional image that science triumphs *solely* by virtue of individual doubt and empirical reasoning. Students accordingly need to learn about how science's system of checks and balances works.

Knowing to trust the consensus of the scientific experts is a valuable benchmark. But who speaks for science? Here, it is helpful to know about the professional scientific institutions that embody and report the consensus: the IPCC, WHO, NOAA, CDC, EPA, FDA, and so on. Others may claim to represent science, even the consensus of scientists, but it may be just another disguise, hoping to trap the unwary social learner. Ultimately, the solution to the inherent flaws of social learning may be, ironically, social learning itself, one layer deeper. Learn which institutions represent authentic scientific expertise and are worthy of trust.

In summary, then, like our primate cousins, we engage in social learning. The misinformation crisis can be seen as rooted in that process, not as a deficit in individual cognition. That awareness might lead us to appreciate, by comparison, the social dimensions of *exposing* misinformation—and the social architecture of science itself, as illustrated in the case of the early women primatologists.

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