

Why Some Apes Imitate and/or Emulate Observed Behaviors and Others Do Not -- fact and theory

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Our main thesis is that there is no average, no universal chimpanzee. It is for this single reason that different laboratories are reporting very contradictory conclusions as to whether or not chimpanzees imitate or emulate the behaviors of others. This presents a very serious problem and a source of unwarranted controversy to no constructive end – particularly if the authors have set about to define the Rubicon that separates ape from human. The view that chimpanzees are chimpanzees and that one may take any of them and reach valid population-wide conclusions regarding the species is simply wrong. There are no standard off-the-shelf primates—of the human or nonhuman variety.

What factors generate profound differences in imitative aptitudes between groups of chimpanzees, both in the wild and in captivity?

First, all apes have relatively large, complex brains. Such brains are highly plastic in that they are particularly sensitive to rearing and cultural differences; it is during the early years of life that environmental factors might have their primary impact upon any number of important behaviors and capacities. All too frequently, we know little of the rearing conditions experienced by chimpanzees used in studies, and all too frequently the descriptive reports of how they were reared is all too sketchy. Terms like “captive reared, mother reared, hand-reared, nursery reared, and surrogate reared” are helpful but fundamentally incomplete and problematic to assess by way of their effects on later imitation and other cognitively related behaviors.

Indeed, rearing variables are so powerful that they can either forestay or amplify behavioral tendencies that otherwise are highly predictable within a genetic strain. Impoverished environments and either no or inappropriate social experiences are known to have long-lasting and apparently irreversible adverse consequences on intelligence, social and communication skills, breeding and parental competencies, as well as on personality, responsivity, and affect. Thus it is clear that both within and between laboratories and field sites, one should expect and will obtain substantial variation among chimpanzees. It is impossible to hold rearing procedures

and social experiences conditions constant across a number of apes even within one laboratory. It is even more unrealistic to assume replication of rearing conditions between laboratories. Accordingly, apes will differ in their capacities, their attentiveness, their responsivity, in short, their everything.

It also is clear that methods of inquiry are very difficult to replicate, be they made in the laboratory or in the field. Different apparatus and/or measurement methods can yield results that are strikingly different. We know, for instance, from our own work that the learning processes and abilities of rhesus monkeys studied within the context of the Wisconsin General Testing Apparatus are markedly different from those obtained in our LRC Computerized Testing System. The differences are so great, both qualitatively and quantitatively, that there now are two disparate bodies of literature on the learning abilities of rhesus. That literature now reveals that the learning process of rhesus changes from exclusively associative to relational as a function of protracted work in our system. Rhesus are reluctant relational learners, but, indeed, they are capable of it. Too, there are differences between computerized systems. Touch-screen technology can be expected to produce effects very different from that which employs the more ubiquitous joystick-technology introduced by our laboratory.

Notwithstanding, when two or more methods of inquiry that appear to be equivalent yield apparently the same kinds of positive effects, we have more far more confidence in the findings than if we have two or more systems that yield negative (e.g., no) effects. Negative results or findings of “no effect” have and always will present the cull de sac in that one can never prove the null hypothesis. Never. Even a cadre of studies yielding negative results can be overturned by a single study – and there are instances where this has frequently happened in our laboratories.

These and other factors mean that we have every bit the problems to worry about in research with apes that we have with children – small Ns, both simple and interactive effects of rather subtle variables, and so on. Replication of findings becomes highly problematic, particularly if one is dealing with treatment conditions that span not days or weeks but years. Consequently, it is not possible and never will be possible to replicate rearing procedures and methods of enculturation between laboratories.

So what can we do? First, we should recognize the highly problematic terrain within which we all conduct research. Second, we might well weight more than we do otherwise the single case, the single instance within an otherwise small group in which some remarkable finding is obtained. Third, differences between the colonies of chimpanzees and, also,

between methodologies need to be more carefully evaluated before negative differences reported from one laboratory are used to counter the positive effects from another. After all, clear and strong positive results with even a single chimpanzee forever precludes the flat-out assertion that the species is incapable of, let us say, imitation or the imputing of cause-effect competence to others. That said, there is no substitute for replication of findings in due course if not in the near-term.

Now, just why some apes imitate and/or emulate behavior they observe whereas others do not is our major point in this paper. That some researchers hold that their chimpanzees manifest these behaviors whereas other researchers hold that, in general, chimpanzees do not imitate is not trivial. Imitation and/or the ability to emulate the behaviors and problem-solving skills of others to achieve effective solutions of tasks are important because they assay the ability of the subject to take its observations of others' behavior and translate them into their own behaviors – no insignificant or simple process

Learning by observation and imitation likely builds the foundation for language and creativity, even during the protracted years of infancy that all chimpanzees experience. During those years, clearly they silently learn models for their behaviors in subsequent phases of life. Their learning is

“silent” in that it is often not translated into overt behavior until months or years later. Such learning also is important because it occurs even while the infant is incompetent motorically even to approximate the behaviors of its model.

And, who are the effective models for infants to learn from by observation? Their mothers, first and foremost. Apart from the mother we can imagine a gradient of decline to other social associates – siblings, playmates, other adults, and even humans.

Now, just how such learning can be accounted for within traditional models of learning is another key point. The answer is – It is cannot be! The process whereby observational learning occurs has not been the subject of much theory, but here we hold that it can be accounted for within terms of the learning perspective advanced as the core of rational behaviorism (Rumbaugh & Washburn, The Intelligence of Apes and Other Rational Beings, Yale University Press, 2003.)

We are not reinforcement theorists in the traditional sense of history. We do not hold that learning fundamentally is motor based and controllable by specific stimuli as a result of defined histories of reinforcement. Notwithstanding, we know and agree with others that the consequences of behaviors do have an impact both upon what is learned and the profile of

performance or overt behaviors. In our framework, the salience of events is a key factor.

Translated into observation learning by infant chimpanzees, this framework holds that the chimpanzee will become uniquely attentive to salient events that co-occur with high reliability across time. Predictability becomes possible as events – even behavioral events – co-occur reliably. We posit that the perceptual and neural systems of organisms are uniquely designed per species to attend to patterns of events relative to its natural ecological niche rather than to noise (e.g., unpatterned, random events).

For example, as a mother chimpanzee goes about cracking nuts with a hammer stone on an anvil provided by an anvil stone, the infant witnesses over and over a predictable pattern of events. This pattern enables the infant to engage eventually into a playful attempt to crack nuts, though by Matsuzawa's report it might take them five years or more to become at all competent. For them to use a shim to level a flat rock that serves as the anvil for nut cracking is a special skill that requires even more time. Until such time, mother might well provide the necessary shim so as the level of anvil for effective hammering of nuts to occur.

Thus, the long-term relative salience of stimuli and events and responses thereto are heavily determined in the infant ape's life by what its mother and other apes of lesser salience do. Because no two infant apes have identical environs of salient beings and events surrounding them, profound differences among individual apes are cultivated in what they attend to – including their attentiveness and emulation of others' behaviors.

Do the principles of salience apply to responses to novel events, curiosity, and inventiveness? Yes. Any stimulus and/or context that is new or relatively new will attract attention and probably responsiveness as well. Such is the case as well with the dynamics of social play. Play bouts are, by definition, changing and dynamic. Notwithstanding, within the stream of play there are recurring scripts or sequences of activity. They are not only marked by change, but also can be highly salient if play is very active. Play affords a stream of salient stimulus and motor events that elicit attention and response and that can be learned in their temporal relationships in play and its outcome. Encounters with strangers and/or re-encounters with conspecifics after a time of separation are events of high salience and provide a plethora of opportunities to learn about their co-occurrence and sequelae. These kinds of experiences can equip the participants with a rich body of knowledge regarding social events. Thus, the avid play behavior of

young chimpanzees likely helps to prepare them for successful hunting, breeding, parenting, fighting, and so on.

All opportunities for chimpanzees, be they participants or observers, afford the opportunity to learn about the logic-structure and the rules and many dynamics of behavior. That said, the opportunities availed to infant chimpanzees are known to differ widely among and between both field and captive settings within which their skills and learning assessed. It is this fact that should preclude the risky behaviors of authors to claim that whereas human child can do thus and so, chimpanzees cannot.

Now for a story to make the point. The point of the story is that there is probably only one chimpanzee in the world that would do what one did on one unique day in my life. That such is surely true does not mean that the following account is other than correct in detail and significant in implications.

I (Rumbaugh) love jeeps--old jeeps. One of my older jeeps, at the time only recently purchased, had a beautiful black padded cushion across the top of the dash. It was flawless and was one of the reasons I decided to buy the jeep. With Dr. Sue Savage-Rumbaugh of the Language Research Center and with two young apes – then about 2-1/2 years old – the four-wheel driving feature of the jeep was being enjoyed on the rough trails of the

forest which surrounds our laboratory. We stopped and walked about for a bit, then returned to jeep to continue onward. Sue and the bonobo, Panbanisha, entered from the passenger's door. The chimpanzee, Panzee, entered through the driver's door – my door.

As I set about to start the engine, I noted the distinctive pattern of fresh chimpanzee teeth embossed in what had been the flawless, beautiful black padded cushion on the top of the dash. With dismay, laced with disgust, I complained, "How did these get here?" The reply from Sue was, "Panzee did it as she came across your seat. You have to watch her!" My penetrating eyes then focused upon Panzee's as I asked her in earnest, "Panzee! Did you do this? I'm really disappointed in you," – as I pointed to the teeth marks.

I really didn't expect to be "heard," and I certainly didn't expect a response. Yet very gently but firmly, she then took my right hand, opened and held it, palm up, in her left hand. She then brought her closed right hand across her body, opened it, and gently pressed something – which I did not know that she had – into my hand. All the while she never broke her focused attention to my eyes as she did so. Next, she firmly closed my fingers about the item, then rather forcibly pressed my closed hand, to my chest. She then broke her visual fixation on mine, turned her head forward

and then looked through the windshield at the trees beyond as though she was ready to go on.

Only then did I open my hand and find the item she pressed into my hand, a single flower.

What did she say? I know only what I "heard" nonverbally from her behaviors. The social impact upon me was that I wasn't angry any more. I was impressed, very impressed with what I heard. What Panzee said by way of giving me the flower was not anything that she had been taught to do, and it certainly was nothing that she had been rewarded for doing or that she had seen modeled by others. Her behavior was an invention of the moment – her invention. No words from her, had they been possible, could have been more elegant, more appropriate to the occasion.

I cannot say why Panzee did what she did with any degree of precision, and I do not offer the experience with her as scientific proof – or even as nonscientific proof – of anything. Rather, I offer it for what it is – a message by a chimpanzee. Panzee's behavior was innovative and creative. It certainly was not based on any specific or intended history of training. At best it might reflect occasions on which, while maturing, she saw one chimpanzee or one human placate the distress and/or anger of another by offering something at hand. I doubt that there was or is another chimpanzee

in the world who would have responded to the challenge of the context by literally forcing a flower on to me, forcing me to take it, and then to move on to the impending event of starting the jeep to traverse the steep rocky slope ahead.

Here, on this occasion, Panzee was fortuitously well-equipped. She had a flower in her hand. Just how she gave it to me was a message that defies explication by contemporary psychology.

Although no experiment in the laboratory could be expected to yield such rich behavior, there is a host of studies that have yielded findings in total support of the argument that, yes, a chimpanzee – and perhaps particularly a young chimpanzee – can "say" such remarkable things. Every parent does the same all the time with their pre-speech children. The methods of science are well designed to "set us apart" from receiving many important communications from animals. We need ways to bridge the chasm and can do so by devising new theoretical frameworks and inventing new methods of inquiry.

In the meanwhile, let all remember and be guided by the principle that there is no average, there is no off-the-shelf, there is no universal chimpanzee! – or other species of great ape! – or human! Although every individual is completely representative of its species, but no individual (or

small group of individuals) represents its species completely. Obviously, the point is that every chimpanzee is indeed a chimpanzee, and it only takes one to show something wonderful; but no one can show all of the abilities or limits of the species.

There can be averages of measurements, averages of chimpanzees, but there never will be an average, off-the-shelf chimpanzee!

Note

The framework here advanced is that of rational behaviorism advanced by the first two authors in their book, Rumbaugh, D. M. & D. A. Washburn (2004) The intelligence of apes and other rational beings. New Haven, Connecticut: Yale University Press.

Preparation of this paper and much of the research referenced in it were supported by the National Institute of Child Health and Human Development grants HD-06016 and HD-38051. Additional support was extended to the first author by the Great Ape Trust of Iowa