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We All Like New Things: A Comparison of Human Ape Reactions to Novelty

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We All Like New Things, Or Do We?
A comparison of human and non-human primate reactions to novelty.

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Abstract

The study of reaction to novel situations, objects, and foods is used to learn more about the development of species' populations in new environments, as well as the development of humans' and non-human animals' exploratory behaviors; these exploratory behaviors, and their variation across species and individuals, can have great impacts on the expansion of our knowledge of animal learning capabilities. In some cases, an individual or species might be characterized as being neophobic (having dread of or aversion to novelty), neophilic (having love of or enthusiasm for what is new or novel), or indifferent. The likeliness for an individual to be included in one of those categories depends both on what it has learned from its socialization with its own species and from experiences from exploring its environment (as range expansion often brings animals into contact with novelty), especially the maternal influence of the individuals' experiences, and the individual's genetics influencing its likeliness to explore or focus on remaining within a safe and familiar space. The aim of this paper is to compare response to novelty among human children, young apes, monkeys, and species of birds. It has been found that human children and apes tend to rely much on their caregivers' physical presence and attentiveness, while monkeys tend to reject food sources unless there is a higher level of certainty that they are indeed safe for consumption. Bird species discussed within this paper (i.e. house sparrows and ravens) appear to be the most cautious when subjected to novel food sources.

Table of Contents

Introduction

Why is it that novelty such as toys, foods, and even people can sometimes be stimulating and enjoyable, while at other times these same kinds of experiences can be frightening? Is it something that everyone struggles with, even other species? If it is found to be similar across-species, then does this mean that either the pleasure or fear experienced is caused by an evolutionary trait? Understanding the underlying reasons for our initial and learned responses to novelty will help scientists in their research of what might be the optimal learning conditions for each species of animal being studied. This kind of study could also lead to the discovery of new lines of relation to animal species that human beings are not considered to be closely related to (i.e. rodent species- Hasegawa, Kishino & Yano, 1985). This paper will examine humans and other great apes as its primary subjects, since the genetic relationship between these species is the closest (Hasegawa, Kishino & Yano, 1985). It is possible that the findings discussed here will continue to be applicable in more and more distantly-related animal species, such as monkeys, rats, and birds; the broader characteristics that are shared by many species can be studied further to help researchers to improve their concepts of the progress of evolution.

Goals

There are two main goals for this thesis: the first is to compare the general reactions of human children and young non-human primates to novel foods and experiences with novel objects. The second proposed goal is to study the parenting/rearing methods that are implemented to either reinforce or discourage certain behaviors that young have toward those novel foods and experiences. These methods

include exposure to novelty by an attentive parent/caretaker and the effect of any reassurance provided by that influence (through acts of providing social cues to their young). This paper sets out to compare and contrast primates' reactions to novelty, in its many forms, and to use this data to remind the reader of humankind's close relation to these other animals; by showing that we share evolutionary traits with species that we now feel so disconnected from, it can be a useful tool in future research comparing humans with non-human animals.

Why Study Animals At All

There is an apparent lack of research comparing the reactions to novelty that are exhibited by children and nonhuman animals. While the attachment styles of human children with their parents have been adequately researched, the basic evolutionary mechanisms are not necessarily extended across diverse species. For instance, the effect of maternal facial expressions on a child's willingness to venture into unknown territory is a commonly accepted study of child attachment, maternal reassurance, and social referencing (Sorce, Emde, Campos, & Klinnert, 1985). However, the effects of this method for social referencing vary across the child's developing age (Walden & Ogan, 1988), and the age most representative of a young ape's (or, any other animal species being studied) reaction styles will need to be determined and used as the focus of the comparisons.

An early study done regarding animal reactions to novelty and their use of social referencing was with macaques; this study found that macaques were more likely to exhibit a fear response towards a stimulus if they had witnessed other individuals within their social group already doing so (Russell, Adamson & Bard, 1997). A second study

that supports a similar finding, this time in tufted capuchin monkeys, found that individuals tend to eat larger amounts of a novel food when they are in the presence of co-specifics eating from the same food source (Timmermans, et. al., 1994). In this case, it was uncertain whether the mere presence of the other monkeys served to reduce the individual's stress, which then made it easier for the individual to sample the new food source, or if the individual quickly learned from watching others eating the novel food that it was safe for consumption (Timmermans, et. al., 1994). This experiment also found that the monkeys tended to react fearfully when exposed to big novel objects, versus small (Timmermans, et. al., 1994); this was surprising since the experimenters had expected the monkeys' reactions to be based on a general phobia, instead it was found that they were only fearful toward the large novel items (Timmermans, et. al., 1994). On the most basic levels of this experiment (ignoring the rearing conditions), it was found that the approach versus avoid reaction was split, nearly 50/50. This statistic is supported by evidence that animals are just as likely to approach a novel stimulus as they are to avoid it and that this is an adaptive trait (Timmermans, et. al., 1994). The delayed reaction exhibited by many of the individuals within these kinds of experiments is considered adaptive, since that hesitation allows time for the stimulus to change through movement or staying still (Timmermans, et. al., 1994).

Another study observed wild rats' reactions to novelty and would be the source of the term "neophobia" (Timmermans, et. al., 1994); according to the Webster's Dictionary, "neophobia" is the fear of new things or experiences. It was found that the wild rat would avoid a novel food in a familiar situation or environment, as well as a familiar food in a novel situation/environment (Visalberghi, et. al., 2001). This finding

suggests that rats are sensitive to any form of change, whether it is their entire environment that has changed or a smaller detail within an established environment. Captive rats did not display the same kind of neophobic reactions and this is attributed to their genetic selection and general experiences in their early lives (Timmermans, et. al., 1994).

In non-mammalian animal species, house sparrows were found to be more neophobic the more established their population was (in this case, 150 years compared to 10 years). Populations of house sparrows that are still active in their invasion of a new habitat will exhibit little to no fear towards novel food options within their new environment (Martin & Fitzgerald, 2005). An indicator that house sparrows exhibit high behavioral flexibility is their implementation of human food waste as a primary source of food, with insects constituting less than twenty percent of their diet (Martin & Fitzgerald, 2005). This may be the most influential aspect of their feeding behavior, since through human food waste, they will discover and taste foods that might not be found anywhere in their surrounding natural environment; this is often the case with the study of non-human animals. Since humans are so pervasive throughout different environments it is extremely rare to find animal populations that have not had some kind of contact with humans and the waste humans produce. Another study found that individual ravens would stand out amongst their peers and initiate feeding; this "initiator" was the first to approach and peck at the discovered animal carcass, and its presence encouraged others to approach and feed. However, if this same "initiator" avoided a food source, then the other ravens would not bother even approaching the carcass (Heinrich, 1988). The role of this individual within the group is an important one, since he or she is the only one that

regularly exhibits this less-fearful response to novelty and will be the most likely to partake of new food sources as they become available. This study provides evidence for individual differences found within a species; this difference might be labeled as a genetic predisposition, as hormone levels are often the cause of individual variation within a population.

In most vertebrate species, there is some variation in the initial reaction to novelty, which can vary amongst individuals also (Kagan, 1997). There is, however, key similarities in the brains of many vertebrate species and it is these similarities that are used to explain the significance of species evolution. The hippocampus detects discrepant events (those that include novel situations or stimuli, that can't be organized into existing categories of experience); when the hippocampus detects these differences, it signals the amygdala to prepare and present the autonomic responses (Kagan, 1997). The reactions of vertebrates vary, but share an underlying trait; monkeys tend to display a kind of facial grimace while other mammals might tend to freeze or go into a defensive posture. Human children, on the other hand, tend to momentarily lose their speech faculties and sometimes exhibit a nervous smile or laugh, this is considered an analogous reaction with the types of freezing and facial expressions that other animals experience (Kagan, 1997). The main mechanism that seems to determine if an animal's reaction to novelty (whether that reaction is fearful or indifferent) will lead to neophobia is the effect of conditioning (Timmermans, et. al., 1994). If the animal is found to exhibit a phobia related to some stimulus, it can be inferred that the stimulus had been paired with some kind of negative experience (i.e. anxiety or fear) since there is no reason for the animal to be fearful of an inanimate object (Timmermans, et. al., 1994).

Food Neophobia

As stated earlier, "neophobia" is defined as a fear of new things or experiences, so the meaning of "food neophobia" can be inferred as a fear of new foods. Food neophobia might often be an adaptive trait since it can prevent the ingestion of harmful or toxic foods (which may trigger certain food allergies or vomiting, etc.). By hindering a child's likeliness to try new foods, that child's diet is restricted and lacking in certain vitamins, nutrients, etc. (Russell & Worsley, 2008). One might assume that any foods that are high in sugar, salt, and/or fat-content would be the preferred options for all children, with food-neophobic children being more particular in their choices of foods that are considered healthier options; however, this is not demonstrated in the experiments conducted by researchers (Russell & Worsley, 2008).

Food Neophobia as Helpful or Detrimental for Species Survival

Food neophobia may protect animals from ingesting potentially harmful foods, but what happens if the animal's environment changes? If familiar food sources are used up, or if the animal is forced to move into a new environment that doesn't have these food sources, it must be able to find sustenance; these are the kinds of situations in which food neophobia might be an impediment to survival. With a limited store of energy and impending hunger, individuals may be more motivated to sample the first available food sources it finds. The more opportunistic consumers would be most likely to discover viable food sources, survive the environmental changes, and reproduce; so, any genetic effect that may have served to make this individual of the species more 'adventurous' will be passed on to its offspring. However, if the same individual eats something that poisons it, then all opportunities of passing on these adventurous genes are cut off by

death. Food neophobia, specifically, has been studied in humans, primates, and non-primate animal species (Timmermans, et. al., 1994). – including rodents (Cowan, 1977), ravens (Heinrich, 1988), and house sparrows (Martin & Fitzgerald, 2005), with exploration in tasting and eventual consumption of novel foods sometimes being a learned behavior. Human children's liking certain foods is positively reinforced through the effect of feeling satisfied after eating something that tastes good to them; this shows that food-neophobia is not likely to be dependent on the nutritious value of the food choice. It will depend on the individual whether he or she is likely to approach or avoid the novel item, since they may be drawing on past experiences and recognition of similar situations. One example of this, which was discussed earlier in the paper, is the influence of having either an active biological mother or a static surrogate apparatus (Timmermans, et. al., 1994).

Food neophobia is used to study many species since foods that should be unfamiliar to specific species are able to be approximated better than unfamiliar situations (i.e. mazes, novel objects present in environment, etc.); this food neophobia can occur in two forms, taste aversion and immediate dismissal of the proposed food choice after simply seeing the option, each of which greatly affects a human child's likeliness to try the food item (Birch, 1998). One experiment that tested which of these exposure types (looking at or tasting the food) would reduce a human child's food neophobia used seven novel foods (fresh and dried/canned fruits) to observe the children's skills of judging the food's aversive-ness. Children were asked to either look at the food choices or to taste each of the food choices; later in the experiment, each child was asked to identify which one they liked best (Birch, 1998). It was found that tasting

the food item generally led to the child's later preference in a food choice of either that novel food or another that the child was already familiar with; however, there was some interference with the experiment, since some of the presumably novel foods were immediately recognized as "familiar" and were often selected more readily. This experiment provided additional support to the "learned safety interpretation" of children's food choices, which will be further described later in this paper; as the children became more familiar with the flavors of the initially-novel food choice, the foods were rated as more tolerable to the children's taste preferences (Birch, 1998).

Neophobic vs. Neophilic Responses to Objects

There are incidents in which a child might be wary of something other than food, such as new toys, people, or new pets being introduced to the family. By the time children are eight months old, they are able to recognize these unfamiliar stimuli; often, children will respond either by quietly staring at the stimuli, or by crying out in distress (Kagan, 1997). In these types of cases, exposure is the most effective way of desensitizing the child to the unfamiliar thing. If the child continues to avoid the novel object or person, then the fear response will persist and there will be no change in the avoidance response. However, if the child is gradually exposed to the stimulus, then the neophobic response might be expected to taper off, possibly to a point of no realized fear (Kagan, Snidman & Arcus, 1992).

Neophilia

In contrast to object (or people) neophobia, sometimes children actually prefer novelty over the familiar; one can ask why this would occur, since its evolutionary purpose might seem less obvious. Children that lack novel experience in their routines,

often those that are very young, will actively seek out sources of novelty (Smock & Holt, 1962). This curiosity can greatly benefit the individual; children desire new experiences to be able to be classified in already-existing schema, they will look for some sense of familiarity (Smock & Holt, 1962). Age plays an influential role in this phenomenon, since human children and non-human primates of a very young age tend to rely on their caregiver's cues before reacting to novel foods or objects; however, as these same individuals develop, they become more likely to independently approach the same kind of stimuli.

Determining Subject's Interest in Novel Stimulus

A method used to examine a young child's interest in novelty is to show unfamiliar images along with more familiar ones; it can be expected that children will exhibit more interest, by looking at it for a longer period of time, in a more unfamiliar image. In one experiment, using Figure 1 (Smock & Holt, 1962), researchers tracked the gaze of children and found that it typically lingered on the most unfamiliar image of the group of simple illustrations. In this example, the most irregular shapes were the most interesting to the child as they attempted to organize it into their increasing repertoire for the classification of shapes. This effect can be assumed to be due, in part, to the child's developmental age; children that tend to display this kind of response to novel images are typically between the stages of total lack of schema and well-developed ones. Since these children need to continue their process of classifying new experiences in order to lay the foundation for their own future recognition patterns, the behavior of intensely studying each shape is an absolutely necessary tool in their cognition. It was also shown that the child's recognition of varying stages of familiar shapes being drawn aided in its

understanding of the drawing sequence. If this sequence was disrupted or out of the expected order, the child's gaze lingered for an increased length of time (Smock & Holt, 1962), indicating that it required additional time in order to accommodate the image into its pre-existing schema.

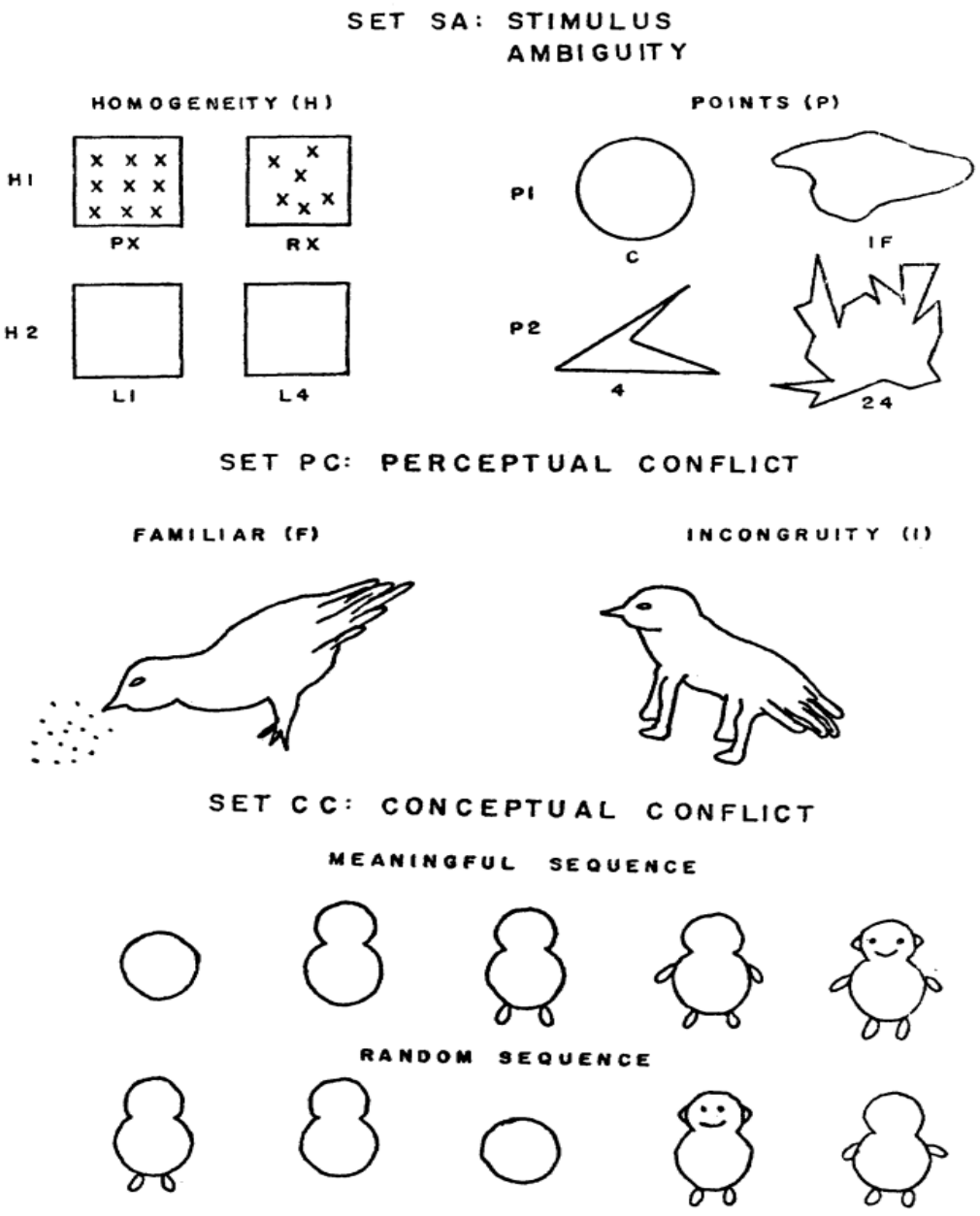

Figure 1: A visual example of what test subjects were shown, in Smock & Holt, 1962; the time spent looking at each shape in the set was logged and used to determine which individual shape within the set was most interesting to the participant. It was found that the more irregular the shape, the longer the child looked towards it.

Along with visual stimuli, a child's desire to explore an unknown space is also a powerful motivating experience (Smock & Holt, 1962). In an experiment, a child was shown a familiar toy being put inside a box, then that same child was told that a new toy was put in an identical box (this was done behind a screen, so the child could not see the novel toy) and he or she could choose which toy they wanted to play with. Children's preference differed over exposure time, but the child's curiosity appeared to be the driving force in choosing the hidden toy over the familiar one (Smock & Holt, 1962).

Neophobic vs. Neophilic Response As Determined By Caretaker's Presence

When novel objects were introduced to monkeys, the greatest determining factor that affected their likelihood to approach or avoid the object was their rearing type: surrogate-reared or biological mother-reared (Timmermans, et. al., 1994). There was no apparent effect on individuals, whether or not their mother (either the surrogate apparatus or biological mother) was within sight. There was, however, a characteristic of each rearing method that had a significant impact on the young's likeliness to explore novel objects in their environment: mobile and interactive mothers caused the young to experience more exposure to novelty. Surrogate apparatus-mothers were immobile and thus had no power to introduce the young to any new objects (Timmermans, et. al., 1994). This finding shows that the young monkeys are often dependent on their caregivers to provide novelty early in their lives.

Non-human animals' general reactions to novel places and objects tend to be affected by their sense of security within their environment (Timmermans, et. al., 1994).

For instance, one experiment studied how wild rats have adapted to manmade environments by extensively exploring new environments after being introduced; the same species of rats were seen exhibiting caution with novel objects, which is thought to be a coping mechanism since it aids the rats in avoiding traps and poisons that humans often use (Cowan, 1977). This experiment also included trials with laboratory-raised rat colonies, which were seen to react similarly to wild rats when placed in novel environments, but who were also much more exploratory when they discovered new objects in their environment (Cowan, 1977). Rats have also been shown to exhibit more or less fearful responses, depending on specific characteristics of their mothers (in essence, they were "programmed by maternal effects"); these include maternal behaviors such as nursing and licking the rat pups during their first week of life (Weaver, et. al., 2004). Offspring of more attentive mothers that groomed them regularly are less fearful and show improved skills in regulating their stress responses than offspring of less-attentive mothers (Weaver, et. al., 2004). This effect persisted over the lifetimes of the rat young and was found to be rooted in the fact that the individuals' DNA structure was changed during this first week of maternal care (Weaver, et. al., 2004). These biological changes work on an evolutionary scale, since the genetic characteristics that affect a caregiver's attentiveness are then passed on to the offspring and on to further generations.

Caregiver Influence

Social referencing is the seeking of information from another individual and the use of that information to evaluate a situation (Russell, Adamson & Bard, 1997). Social referencing in primates is becoming a more popular area of study as there are breakthroughs in animal studies; this topic of study is expanding to involve comparing

the influence of maternal reassurances in novel situations in young ape and human children's behaviors. Individual personalities and temperaments (i.e. shy versus outgoing) will be responsible for intra-specific differences, but the underlying similarities should be apparent throughout the animal realm (Kagan, Snidman & Arcus, 1992). Mammalian infants tend to be more likely to approach a novel object if their mother is in sight; in contrast, the sight of an unfamiliar adult will generally cause the infant to be initially avoidant of the same stimuli (Kagan, Snidman & Arcus, 1992).

In one study of rats, the mother's diet directly affected offspring's flavor preferences, through flavor cues found in her breast milk (Birch, 1998). Since mammalian diets consist almost exclusively of milk for their early lives, this influence of the mother's milk is an early and strong one (Birch, 1998). This early exposure lays the foundation for the young's preference for foods that are familiar and available to its mother; knowing the availability and safety of the food in offspring's environment will greatly benefit the animal as it matures. This example is especially relevant, since it provides data supporting the idea that taste preferences start very early on (in this case, soon after birth) and that the time of this primary development can be crucial to developing taste preferences (Birch, 1998). As young mature and experience new food sources, they will go through a testing phase, which often lasts the entire lifetime of the individual (if they are in changing environments), in which there is a learned safety effect (Birch, 1998); a basic understanding of this effect is derived from an experiment using rats in which the rat ingested a nontoxic, novel food and experienced no damaging effects, thus the food, in the rat's mind, was deemed safe. The longer the rat goes without any feeling of discomfort associated with eating the novel food, the more likely it is that

the rat will continue to eat that food (Nachman & Jones, 1974). During the first five years of a human child's life, they are exposed to culturally acceptable foods and begin to develop their own preferences; some cultures may embrace food sources that seem exotic to others, while others prefer "safer" options. As children increase their repertoire of novel foods, they could become more likely to sample foods that are still outside of the normal diet.

In social referencing studies involving human subjects, the child often looked to the caregiver for guidance; after receiving either an encouraging or discouraging response from a caregiver the child made its decision to approach the stimulus/ try the new food choice, or avoid it. A child is much more likely to taste a novel food if received from its caregiver, rather than from a stranger. This effect was further amplified if the child saw its caretaker taste the food before giving it to him or her (Visalberghi, et. al., 2001). One experiment measured each subjects' level of social referencing using an unfamiliar situation (vs. food or object); the situation involved an apparatus called a visual cliff, in which the child was placed on a platform which seemed to drop off at its edge (really, the plexi-glass platform was present the entire length of the space and the tiles were sized differently so as to look like there was a dramatic drop-off). The child used social referencing skills to decide whether or not it should crawl near, and even over, that edge (Striano, Vaish & Benigno, 2006). Active referencing does not occur when the child is a very young age, but begins around six to nine-months-old. This is the age when the ability to study another person's facial expression is developed enough to make decisions (Walden & Ogan, 1988). An example of this can be seen in Figure 2, in which a child is shown approaching the visual cliff and referencing the caregiver's facial response.

Figure 2: Social referencing while experiencing a novel situation, the visual cliff.

Social referencing is fairly well-documented in human infants, but there is a limited supply of scientific research studying the same phenomenon in other species, including non-human apes. One experiment set out to observe seventeen young nursery-raised (by human caregivers) chimpanzees while they were in a standard social referencing paradigm (similar to the visual cliff described above). According to this study, social referencing has been developed by animal species in order to save time and effort that would be spent learning through trial and error (Russell, Adamson & Bard, 1997), not to mention the avoidance of impending danger. The experiment found that it was necessary to use nursery-raised chimps so that a human participant could follow instructions in manipulating their caregiver responses; if the chimp subjects had been with their biological mothers that were not able to directly communicate with the researchers and follow their instructions, the study would have been much less successful. The caregivers were instructed to give either fearful or happy responses whenever the young chimp that they worked with looked at them. The young chimps often exhibited either a fearful or interested response to the novel object before referencing their caregivers, but the caregiver's reaction either strengthened or lessened

the chimp's initial response. Since the chimpanzees looked to their caregiver for reassurance, and behaved according to the response they received, the authors concluded that chimpanzees did indeed perform social referencing in novel situations (Russell, Adamson & Bard, 1997). The main difference between young chimps and human infants' responses was that the chimpanzees in this experiment always looked to their caregiver for reassurance, whereas human infants would sometimes approach the novel object without ever looking at their caregiver (Russell, Adamson & Bard, 1997).

Chimpanzees are very social throughout their lives; in the wild, they seek comfort from other chimps whenever frightened (Russell, Adamson & Bard, 1997). They have been seen pointing at objects that they desire and actively repeating a modeled behavior, so it has been suggested that chimps use social referencing; however, there is little scientific evidence and research to support this idea. In one study, young chimpanzees were more likely to seek contact with their mothers while in the presence of a novel object; however, this cannot be termed social referencing, since it seems to be a simple fear response (Russell, Adamson & Bard, 1997).

Why Should We Compare Humans and Non-Human Primates

Since the fear responses and rearing methods of humans and non-human primates are similar, in that they have close bonds with their mothers (often due to nursing habits), seek contact with caregivers when in strange situations, and are more likely to approach novelty when reassured by their caregivers; they make comparable test participants (Russell, Adamson & Bard). Securely attached parents/caregivers (those that have a relationship with their child that is characterized by the child having a sense of security that the parent/caregiver will protect and provide for them) will be more attentive towards

their young, tending to offer more opportunities for exposure to novel foods and objects (Holmes, 1993). The studies addressing social referencing will provide basic information on how young humans and apes will extract necessary information from their co-specifics and implement that information while exploring novelty. In human development, there is a general term for children's level of explorative tendency, inhibition, and a child can be either inhibited or uninhibited. An inhibited child is likely to seem shy, especially around strangers or strange situations, whereas an uninhibited child is much more outgoing and unafraid. Differences between these two classifications could be seen in a child's autonomic functioning (fight or flight responses to stress, etc.), affect (ability to express emotions to others), and physical features (posture, height, etc.); however, a child cannot permanently be categorized as either 'inhibited' or 'uninhibited', as environmental influences can have further effects on the child's exploratory nature and the child's inhibition may become more or less severe over time (Kagan, Snidman & Arcus, 1992). This information has served as supporting material to the hypothesis that an individual animal's general reactions to novelty (being neophobic vs. neophilic) can be based on its genetic predispositions.

Social referencing abilities have been specifically selected for in early development of apes and humans. Some studies suggest that forward-facing eyes developed so that co-specifics could follow each other's gaze to an object of interest (Russell, Adamson & Bard, 1997). Results from one study comparing human children and non-human ape young included a common set of superficial similarities throughout the developmental stages; meanwhile, deep similarities will exist between humans and

non-human apes during early social development, and would eventually decrease with continuing development (Kagan, Snidman & Arcus, 1992).

Future research is needed to study several aspects of the phenomenon of neophobia, including the biological caregiver's influence on young apes. Studies with apes have shown that they will often look to the caregiver for guidance; however, with food trials, they were much less likely to partake of the novel food source, even after observing the human caretaker eating it. So, non-human apes tend to be more cautious with tasting novel foods, especially compared to human children (Visalberghi, et. al., 2001). On a neurobiological level, researchers found that rearing methods impact young animals' ability to cope with novelty (Timmermans, et. al., 1994). The rearing conditions, either surrogate-reared or biological mother-reared, affected the levels of norepinephrine in young rhesus monkeys; increased levels of norepinephrine soothe individuals, while low levels of norepinephrine when separated from the caregiver cause a sense of despair to be felt by the young rhesus monkeys (Timmermans, et. al., 1994).

So, why is the comparison of humans and non-human apes so important? Through many of the studies that have already been discussed in this paper, the reader has seen how important it is, to both human and non-human ape development, that the individual is able to experience an attentive caregiver and a safe environment that promotes exploration and learning. Without these pre-requisites being met, optimal social development would be difficult.

What This Means For Human Parents/Caregivers

Exposure to new foods is essential for a child to determine whether they like it or not; since food-neophobic children tend to be less exposed to diverse foods, it can be

expected that they will have less-healthful food preferences and that they need to be taught better choices and options (Russell & Worsley, 2008). As the child matures, this lack of exposure will cause the child and eventual adult to avoid unfamiliar foods and show preference for childhood favorites. In the case of this later-in-life aversion to novel foods, the initial deprivation of novelty will have a lasting effect through inhibiting the individual's likeliness to try novel foods. So, educational programs for parents to learn how to manipulate their children's food preferences are being studied through experiments; techniques include multiple exposures to the same unfamiliar food item, maternal encouragement to sample these unfamiliar food items, and pairing an unfamiliar food item with a more familiar and previously enjoyed one.

The occasional addition of novel food choices to the regular diet of captive apes has been suggested as a stimulating exercise and as a method for learning flavor preferences for each individual within the group (Visalberghi, et. al., 2001). The European Federation of Primatology, a council that discusses and regulates primate care, advises caretakers of all species of primates to offer a nutritionally adequate diet that is also free of any monotonous pattern; this varied diet is the best known method for both humans and non-human apes, and will ensure optimal growth and development. Parents are being educated to avoid monotony in their children's diets, since it is considered a form of sensory deprivation in many studies (Visalberghi, et. al., 2001). Feeding enrichment is just one method that can easily be implemented, whether it's by the caregivers of animals or human children.

Conclusion

The goals of this paper, as discussed in the introduction, are intermediary steps in the process of the ultimate goal of this kind of research. The ultimate goal would be to establish a global mindset that embraces the developing awareness of non-human animals and their needs for survival and flourishing. It is through the kind of research that has already been discussed in this text, that readers can begin to close the gap between human beings and non-human animals that has been assumed to exist; this gap is merely a social construct and has no standing in the real world setting. Humans and non-human primates are so closely related that it can become a common experience for onlooker humans to feel intimately bound to them and to want to aid them in their fight for survival.

In order for conservation efforts to stand any long-term chance, humans must be able to use the rational thought we developed to benefit species other than our own. By taking a step back to assess the environmental situation that many of these non-human animals are subjected to, humanity can realize that these animals require the same kind of stimulating and healthy environment that humans enjoy. If we are able to reach this conclusion as a species ourselves, then we can take action to ensure that the future for non-human animals will be one in which they can thrive.

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