

I would rather suggest that confinement in narrow spaces and the resultant ennui, and the lack of need for long and arduous journeys, with their attendant exhaustion, are factors favourable to the use of the objects. But the response of the chimpanzee to these favourable circumstances will always be limited and determined by his own very pronounced natural proclivities. For I must most emphatically state, after a full acquaintance with chimpanzees, that it may perhaps be possible for the length of time taken by a circus "turn", and by beating or such means, to compel them to an action, to a habit, an omission, or a method of procedure which is not spontaneous and the natural anthropoidal response to the particular conditions; but so to *weld* an alien nature into his own that the chimpanzee will continue to exhibit it when not under pressure, appears to me difficult in the extreme, and probably impossible. I should have the highest admiration for a pedagogic talent which could achieve such a result. It is a continuous source of wonder, and often enough of vexation, to observe how every attempt to re-mould his biological heritage "runs off" an otherwise clever and ductile animal of this species "like water from a duck's back". If one is able to produce a—very temporary—type of behaviour which is not congenial to the chimpanzee's own nature, it will soon be necessary to use compulsion if he is to keep to it. And the slightest relaxation of that compulsion will be followed by a "reversion to type"; moreover, while such pressure lasts, his behaviour becomes ugly by being constrained and indifferent to the essence of what has been demanded of him. It cannot be too much emphasized that no conclusions can be drawn from antics performed by chimpanzees on the stage, and under pressure of extreme force.<sup>1</sup>

Therefore, in describing not only the use of tools, but the handling of other objects, as may be observed daily, we need

<sup>1</sup> I remember having read such conclusions more than once, in the past.

have no fears: though the animals may be granted opportunities which they would not enjoy in their native African forests, we shall always in these experiments be observing the natural chimpanzee, and not any artificial product—that is, so long as no compulsion is used; and it is, of course, to be assumed that no human pressure was employed in the observations we are about to describe. When the animals were quite unaware of being under observation, their behaviour was the same.<sup>1</sup>

[This descriptive account does not refer to a limited period but deals with the recorded events of fully two years, because the chimpanzees are very subject to fashions, so that no adequate idea could be conveyed except by an account covering a long period of time.]

The everyday handling and treatment of objects on the part of the chimpanzee comes almost entirely under the rubric "*play*." If under the pressure of "necessity," in the special circumstances of an experimental test, some special method, say, of the use of tools, has been evolved—one can confidently expect to find this new knowledge shortly utilized in "*play*," where it can bring not the slightest immediate gain, but only an increased "*joie de vivre*." And on the other hand one or other of the manipulations undertaken in the course of play can become of great practical utility. We will begin with a form of play that possesses this quality of utility (somewhat overrated in Europe) in a high degree.

Jumping with the aid of a pole or stick was invented by Sultan, and first imitated, probably, by Rana. The animals place a stick, a long pole or a board upright or at a slight angle on the ground, clamber up it as quickly as possible with feet and hands, and then either fall with it in some direction, or swing themselves off from it in the very instant that it falls. Sometimes they spring to earth again, at other

<sup>1</sup> Sometimes even much more interesting

times on to a grating, beams, the branches of a tree, etc., often to a very considerable height. And at first it was certainly not circumstances that "forced the leap upon them." They could have "got there" much more easily by walking or climbing. Also the landing-stages they selected seemed to offer no special attractions, so that when we take into account the constant repetition of this performance, we can only conclude that it is done out of the wish to *jump and leap per se*, just as children walk on stilts "for fun."

But very soon this form of play developed into the regular use of a tool. (Jan. 23, '14.) Sultan made the attempt to reach the objective (in the course of an experiment) in vain, as it was hung too high for him. He leapt straight into the air from the ground several times, and in vain; then he seized a pole that lay in his vicinity, lifted it as though to knock the prize down, and then desisting, put one end of the pole on the ground beneath the objective, and repeated the "climbing jump," as above described, several times in succession. His movements had a certain playful and sketchy character, as though to say: "It won't be any use!" and so it was not. On the next occasion (February 3rd) he was more resolute and more fortunate; he approached a solid piece of plank, so heavy that he could only just cope with it, placed it in position and started climbing and jumping off. Three observers who were present maintained that he could not possibly reach the prize in this manner, and on three occasions the treacherous plank fell over before he could reach the top, but on the fourth trial he succeeded and tore down the fruit.

The use of the jumping-pole spread to Grande, Tercera and Chica and even to the heavy and clumsy Tschego, but skill and success with it varied greatly according to their individual ability. After some time Chica was easily first: she "jumped off" with the aid of short sticks and boards,

and presently with a pole of over two metres long, which had appeared from somewhere. By its aid she could reach anything that was not more than three metres above the ground (Cf. Plate II, and notice that the stick is placed in the ground without other support, and that the house is several yards behind).

Later on, wishing to see how far her capabilities extended, I presented her with a bamboo over four metres long. She immediately showed complete mastery of this tool or toy, and climbed at frantic speed to a height of over four metres before the pole fell over. She herself at that time was not quite one metre tall, when drawn up to her full height. For certain reasons she had to be separated from her beloved toy for some time during the daytime, but in the evening, when she entered the playground where the bamboo lay, she repeatedly interrupted the (to her immensely important) business of a *meal*, in order to seize the coveted treasure and "just once" snatch a hasty jump.

[Of course this clever trick was only possible as a result of experience in placing the stick and controlling her own muscular efforts, in order not to lose balance before she had completed her climb. We must compare this to the achievements of a human gymnast: Chica has a "feeling for it". The draw-back is obviously the violent impact of a headlong fall from five metres on to a hard piece of ground. Chica often inspects and touches those portions of her body which have borne the brunt of the fall, and walks away with slow and subdued gait; but, thanks to her incomparable skill as a tumbler, she received no serious injuries. There was no "training" whatsoever about this, either: *my* part in the matter was solely the gift of the long bamboo. The jumping off was invented, introduced, further developed, and utilized to solve problems in the tests, by the chimpanzees themselves. I could not have altered it if some day they should have

tired of it—only tried to find a longer piece of bamboo for Chica.

Imitation of human beings is excluded in this case. For, although acrobats may perform the same trick, there were none such in Tenerife and the ordinary pole-jumping of expert human acrobats is something quite different—and not customary in the surroundings of the animals.]

A later modification of this accomplishment arose after the apes were enclosed in a narrower room with a low roof of extra strong wire-netting. The pole jump was executed to the height of the roof, the roof was seized but the pole was *not* relinquished, but used as a sort of gigantic office-stool. The obvious sequence is to clamber along the roof by means of the hands, and manage the stick simultaneously with the feet and still in a sitting position ; but this " game " was not observed very often.

If the pole or board were thicker at one end and the weight unevenly divided, a man would always place the larger and heavier end on the ground. But even in the case of Chica it is not evident whether or not she attaches any importance to this. As a rule the heavier extremity rests on the ground, but the other position can also be observed, and it is quite possible that the more advantageous position is only used more often because it entails less effort. When there is but little difference between the two ends, the chimpanzee certainly takes no heed of it. When we see him, or her, using the pole or plank with what we consider the wrong end uppermost, and yet springing with ease, we are inclined to think the error immaterial. But further experience teaches that it is *fundamental*.

[Rana makes an unprepossessing impression when she prepares to " take off " for a high jump, and the stick is too short. The other apes would look up and then throw away the pole, or at most make one attempt and then give it up.

Not so Rana ; she props up the stick, attempts to climb it, stops, turns the stick as though that would make it grow longer, lifts one leg, lowers it again, and repeats this process a number of times, a picture of confusion and helplessness. Finally, as a rule, she squats down, lets the stick fall to earth, and stares vacantly around.

Dogs as a species are on a different enough level from chimpanzees, but as the chimpanzee has the wide range of individual variation corresponding to his high stage in evolution, nature has given to some individuals of this species an occasional expression of incredible and absurd stupidity. No dog could ever look so foolish ; his features always have a certain " neutrality ", and so no dog could show either the alert intelligence of aspect peculiar to very gifted individual anthropoids. Rana's stupidity is conspicuous as she is not only "*bornée* " but also extremely assiduous, and thus continually " shows herself up ", while Tercera, who only rarely takes part in an experiment, has succeeded for years in remaining something of an enigma. It is a significant fact that Rana could never find a real constant playfellow, except little Konsul, whom she more or less mothered as long as he lived. Her fellows had " no use for her ", and Tschego treated the hopeless Rana like a stupid clown.]

The stick is a sort of general tool in the chimpanzee's hands ; it can be turned to account in almost any circumstances. When its use has become common knowledge and property, its functions extend and vary from month to month.

Any object that lay beyond the bars and attracted attention but could not be reached by hand alone, was pulled in by means of sticks, wire, or straws. When the rains were over and the favourite food (green stuff) no longer visible on the playground, herbs and grass still grew outside before the wires. Then a stick was forced through the meshes, and the adjacent plant or bush pressed against the bars, so that the

foliage was within reach ; hours were spent in this occupation. But the wire-netting was old, and the pressure on the diagonal stick tore open a rent through which hands hard as iron and leather could get a grip and then tear holes, large enough to admit the chimpanzee's whole body. For a long time the apes had given no sign of dissatisfaction with their confinement, but after this discovery, we found they appreciated a little " voyage of adventure " keenly. I do not consider that their efforts were directed to that end from the first, but if there was a tear in the netting, however small, we could easily see from afar, by the suspicious assembly of animals at that point, that it was no more a question of green stuff merely. Even if we had not so frequently caught them in the act, the iron or wooden stave thrust through the torn netting would have borne witness after their flight.<sup>1</sup>

The use of sticks evolved in a similar way in the following case. The tank, which received the waste water used to wash out the cages, was closed by a thick wooden lid and iron bolts. But there were cracks, and it became a perfect mania with the apes to squat beside the tank, armed with straws and sticks which they dipped in the foul liquid and then licked. Of course things would have been much easier if the lid had been removed, and, either because it moved easily under the groping hands, or because it was easy to understand the situation, *this* obstacle was removed " early and often " either with the naked hand of a creature whose strength is capable of bursting open an iron bolt bedded in cement, or, later, as we increased the solidity of the structures, prised open by means of the stick, which had formerly functioned as a spoon, but was extremely popular on its promotion to the dignity of *lever*. The chimpanzee uses a

<sup>1</sup> These escapades were attended with no danger from the apes. They were so naïve that, if we scolded them on meeting them outside, they forthwith returned to their abode.

lever in exactly the same manner as a man. Of course the apes have no knowledge of the abstract relations between force, work, etc.,—the factors governing the aspect of leverage in physics—but the carrier, who lifts his car after a wheel is broken by placing a lever under it, hardly knows more about physics. There must be a kind of purely concrete and practical “sense” of such elementary implements, arising from the optical and motor functions of naïve people or the apes that can be relied on (within certain limits) quickly to seize and retain their application (cf. for instance, the case of the jumping-pole). Later on, when the apes shook the lid of the tank in vain, they did not trouble to dip the stick through a crack like a spoon, but at once tried to prize the lid open. Only when the lid would not yield to their efforts, did they begin to dip again.

[The forcible opening of this tank became one of the greatest “fashions” observed among the chimpanzees. It took a long time before they were bored by the sport. It would be erroneous to assume that the main attraction to the chimpanzees was the dirt in the tank. The possibility of thoroughly and methodically “reducing any object to its component parts” must have been quite equally attractive. If a chimpanzee is placed in contact with anything breakable, the result is always fragments—and not because of the animal’s clumsiness at all: *for he has no peace* until the remains and debris either are not worth further demolition, or do not permit of it. Possibly, however, it is only his superior muscular strength that enables the ape to outdo human children in this respect.]

Straws and twigs are also used as spoons in pure “play” during meal-times, when the animals have free access to drinking water. When their first thirst has been quenched in great gulps, one of the animals will take a straw, dip it into the water and suck it: this may happen twenty times



in succession. Once when a mouthful of red wine was poured into the water of the drinking-bowl that they all shared in common, they stooped unsuspectingly to drink, but after the first mouthful they paused for an instant. Then one of them began to dip and spoon up the new mixture with a straw, and three others immediately followed his example with twigs and rags of cloth : it must have been too strong a brew for their usual hearty gulping. There was no imitation of human beings in this case : for at that time they could only by chance have seen a human being using knife, fork, or spoon with his food. These luxuries are not used by the natives in the neighbourhood of the station.

[The straw was used in quite a different manner by two of the animals (Grande and Konsul) on some occasions during the consumption of food. When their hunger is not too acute, all the chimpanzees are in the habit of making a pulp or mess out of the fruits they eat (bananas, grapes, figs, etc.) ; this they roll to and fro in their mouths which are very flexible and often alarmingly expanded, or they contemplate it on their lower lip which is thrust far forward, or take it in their hand and look at it with satisfaction before replacing it in their mouth. Both of those animals had a frequent habit or " fashion " of collecting straws and masticating them along with fruit pulp, but producing them again with great care, in a sort of knot or lump, when they had swallowed the edible part of their meals.]

A " half-way-house " between a spoon and a weapon of the chase is a twig or a straw used to capture ants. At the height of the summer a small species of ant forms a perfect plague in Tenerife. Wherever they pass, they form wide streams of moving brown, and this stream also pours itself along the beams around the wire-netting encircling the playground. The chimpanzee has a special taste for acid fruit, which he prefers to all others ; and so he also relishes formic

acid. If he passes close by a board or beam covered with ants, he simply rolls his tongue along it and gathers them in! On the beam around the wire-netting he could not pursue this primitive method, as the ant-stream was *outside* the wire-netting. So, first one of our animals, then another, and then the whole company, began to stick twigs and straws out through the meshes and drew them in immediately, covered with ants, which were promptly devoured. The second time the saliva adhering to the twig or straw was immensely helpful, as in the fervent heat of summer ants seek any speck of moisture, and run in crowds over the damp straw; indeed, they often had this advantage the first time, as chimpanzees generally lick the tip of a stick or blade of grass before using it for anything, just as some people do pencils. There can be no doubt whatever as to the meaning of the animal's procedure in this matter. They allow one to observe them at the closest quarters, their attention being entirely absorbed by the procession of ants. The straws are held for some seconds motionless amid the densest throng of insects, and when they are swiftly lifted to the mouth and pulled out again, not one ant remains on them. Nor is anything spat out, as is invariably the case when there is an unpleasant taste, e.g., when medicine is smuggled into the food. Probably the "play spirit" was as strong and stronger here than the special relish for ants; for there were enough places available where they could be enjoyed with one flick of the tongue, and, when "fashion" had taken a different turn, the most profuse hordes of ants were simply ignored. But while the fashion lasted, all our animals were to be seen, squatting side by side along the ants' pathway, each armed with straw or twigs like anglers on a river's bank.

From time to time the use of sticks for digging becomes the fashion. Probably the only incentive necessary here is a stick with which the ground can be prodded. Digging

gives more pleasure when the ground is damp than dry, and, when once begun, is carried on with enthusiasm and endurance till the place is full of big holes. The chimpanzee holds the digging stick in a variety of ways : he by no means limits himself to the use of his hands, but, in hard soil, he thrusts downwards, using his great muscular development in nape and mouth, gripping the stick between his teeth. Later on, the foot was used just as often ; the sole, which is extraordinarily tough and insensitive, is pressed hard against one end of a stick held diagonally in both hands, and drives it into the earth. This was not an occasional or accidental method : Tschego nearly always dug thus. The use of the foot as a hand—grasping the stick with the big toe—was much rarer. As will be realized, we are here very far on the way to the “digging-stick” known to our ethnologists.<sup>1</sup> But this resemblance becomes more suggestive, when we take into consideration the fact that, before the “digging-stick” fashion first appeared, the apes had long been in the habit of digging and scraping up roots for food, when green things had withered in the summer heat. They had used their hands first, showing great pertinacity, but when they began to use sticks, their progress was quicker and they could reach a greater depth ; so we cannot be surprised that the laying bare of roots became a favourite pastime. Again, it was the oldest of the animals, Tschego, that distinguished herself particularly in this *rooting*, mainly owing to the enormous power of the limbs, jaws and teeth which wielded her stick.

I do not wish to affirm that a chimpanzee picks up a stick and says to himself, as it were (for speech is definitely beyond his powers) : “All right, now I’m going to dig roots !” But no observer can be in any doubt that, in the course of desultory digging, the discovery of one root is followed by the definite

<sup>1</sup> The foot-pressure method is not copied from us. “Spades” are unknown in Tenerife.

search for more, by digging further, because he is already in the habit of scraping for roots by hand, and now finds that the stick is both more rapid and more convenient. Chimpanzees frequently search for something not already to hand. I made several investigations on the locality-memory of these animals, by burying fruit before their eyes. They not only found the exact spot later, but they looked in the vicinity, digging about before and after finding it (like a human being, for about half an hour, in the hope of finding more. The search for something differs from the mere digging game, very obviously, by the concentrated and eager attention, the hasty scraping and rummaging in the soil, the sifting of loose earth, the lively interest shown in each other's plots, etc.

Objects which are interesting, but unpleasant to handle, are forthwith approached by means of a stick. Nueva was once sitting beside me before a pile of twigs, which I set alight in order to observe her behaviour. She looked at the flames with a moderate degree of interest for a while, and then grabbed at them with her hand, which she at once hastily withdrew, only to seize a handy stick and poke it into the fire.

If a mouse, a lizard, or any small creeping creature wandered on to the playground, while the chimpanzees were there in occupation, it became a source of excited interest, but the big animals hesitated simply to capture it by a sudden snatch with the naked hand. It was grotesque to see the apes stretch their hands out with the intention of seizing their prey, with fingers pointed, and then, at once, draw back quickly. A firm grip of small rapidly-moving animals or reptiles seems as impossible to them as to many people among the human race. Every movement of the poor fugitive is followed by nervous gestures, half of fear and half of defence. We human beings, in a similar case, automatically project

our elbow, probably because the unpleasant 'tickling' sensation of touching the creatures would be less perceptible there than on the hand. Tschego does just the same. One start forward on the part of the lizard—who habitually moves in small runs—is enough to make the great ape jump and shrink, with a defensive forward thrust of her elbow, while her eyes close as though to ward off a blow. Of course, here too, a little stick is much better than the elbow, for the ape can poke about with it, and, in dealing with these little intruders, the chimpanzees always do use sticks, though in a very nervous manner. When the victim moves quickly in the direction of any ape, the fumbling stick it is true, becomes a weapon, and if the stranger does not succeed in escaping, it is killed after all, not in any spirit of deliberate cruelty, but in sheer excitement of the pursuit and capture. Between the tentative taps and pokes, which they simply cannot help giving any new and strange object, and their automatic defence when the creature moves, it receives so many blows and thrusts that it eventually dies.

Chimpanzees often smear themselves with excrement, either their own or their comrades'. Here a curious point of contrast must be recorded. I have only observed one of this species who did not take to coprophagy during captivity (Koko, to wit). Nevertheless, if one of them steps in excrement, the foot cannot as a rule tread properly after—as would also be the case with us. The creature limps off till it finds an opportunity of cleansing itself, and that by preference *not with its hands* (though it may, a few minutes before, have lifted similar filth to its mouth, and refused to leave go, even when it was given sharp blows on the hand), but with twigs, rags, or pieces of paper. As the ape's behaviour and expression are plainly indicative of discomfort, there is no doubt that filth *on the surface of its body* is disagreeable to it. This always happens when the body is soiled in any way.

The naked hand is not used to remove it, but it is rubbed with rags, etc., or against the wall, or the ground<sup>1</sup>.

Such irrationalities and inconsistencies also appear very frequently when we study ethnology. In considering these cases we must be extremely wary of all strictly intellectualist interpretation of customs and institutions where there is any strong emotional content or background. The repulsive example quoted from the psychology of anthropoids is only a very vivid instance of the possibility and persistence of behaviour logically contradictory for the observer.

I had an excellent opportunity of observing the rapidity and ease with which chimpanzees have recourse to sticks, when they cannot well tackle any object, when, on the first occasion of their lives—at least as far as we can judge—they were brought into touch with high-power electricity. One pole of an induction coil was fastened into a wire basket full of fruit, suspended from the roof, the other was connected with a wire-netting on the ground. I have never seen, in such a short space of time, so many human reactions and expressive movements on the part of the chimpanzees. The starting back at the first shock, the cry of surprise, the cautious second attempt with constant jerks backwards, long before there is any possibility of the current passing through their body: the violent wagging of the hand in the air, especially after a strong shock, which exactly resembled the behaviour of a human being who has inadvertently touched a hot stove: these successive reactions to observe how many of our auto-

<sup>1</sup> To speak more generally, the outer surface of the body is treated with implements by preference. If water or oil are poured on an ape, it will rub off the moisture against a wall, the trunk of a tree, or (by preference) will wipe itself with straw, or a piece of paper. Blood from wounds is wiped off in the same manner, one can often see them dabbing at it with leaves, which are generally moistened with saliva, or touching it with straws. After Tschego had attained maturity, it was patent that, on the occasion of every menstrual period, she dabbed at the blood with paper and rags, to wipe it off. When the skin on an inaccessible shoulder-blade itches, a stone or potsherd is used to rub and scratch the place.

matic responses must have been formed in the dark ages, in which the primates originated.

As in the case of Tschego and the lizard (see above) the chimpanzees of many thousands of year ago, must have leapt back from the touch of any stinging animal or insect, with the same gestures and reactions as we humans from a high-power electric current. Possibly, further research will establish this also in the case of smaller species of apes.<sup>1</sup> But we should probably not find that these latter creatures had recourse to a stick after their first unpleasant experience, in order to extract the fruit without coming into direct contact with the dangerous object. One after the other, all our chimpanzees did this. And at first they succeeded, being armed with staves of wood. But the basket eluded them, as it swung to and fro on its cable. Then, in their eagerness, the apes seized thick wires and iron bars, and, of course, received one electric shock after another. They became very angry, but only Tschego, who had not given up her wooden stick, gave battle to the unknown. Standing at her full height, she belaboured the basket so long and hard that it whirled through the air, and finally fell down. An hour later, the apes were still tentatively stretching their hands towards the now innocuous wire-netting round the fruit, and drawing back before they touched it, even after having frequently taken some of the fruit with impunity.

In this case the stick was obviously used as a weapon, for Tschego was visibly incensed and struck out blindly—in strong contrast to the first careful efforts to extract the fruit from the wire-netting. But this use of the stick is the result of special circumstances. Otherwise it was only used aggressively in the course of “play”—but that often when it became the fashion.

<sup>1</sup> I do not hesitate here to “digress”, if, by doing so, I can give a more lifelike portrait of the chimpanzees.

In the earliest days of my time at the station, the chimpanzees would often approach me in a threatening manner. But I subsequently realized that none of these "attacks" was probably meant seriously. Grande, whose incalculable temperament was always highly excited by any new-comer into her surroundings, frequently advanced towards me like a sabre-swinging ruffian, with bristling hair, blazing eyes, waving arms, and a stick which greatly enhanced the effect of this display; but I could only have supposed that she actually meant to attack me, if, and while, I was still ignorant of the chimpanzees' habits. The sight of any stranger would excite her to the point of such a demonstration, but it seemed to be only a "bogey-man" show. For it never occurs to her to make the game into real warfare. If she is quietly ignored, she waves her stick and stamps up and down for a bit, but finally she gives a dab at one with her empty hand, and gallops off; the battle game is over. It is the same between ape and ape. If one of them takes a stick and approaches another in a bellicose manner, or hits or thrusts at him with it, *that is certainly mere play*. If the other animal should also take a stick—as happens sometimes but not often—and threaten, or thrust with it, that is also definitely play. But if a misunderstanding arises and the game becomes serious, the sticks are flung to the winds, and the apes fall on one another with hands, feet, and teeth. It is quite easy to distinguish playful contests from real ones by the pace of the proceedings all through. The brandishing of sticks is clumsy and comparatively slow, but if a chimpanzee "means business," his rush is lightning-swift and leaves no time for stick-wagging.

[When anyone on the outer side of the bars is to be annoyed—and it is one of the chimpanzees' choicest pleasures to tease each other or third persons—it is done by creeping cautiously up to the wire, and suddenly springing against it.



But apparently much greater amusement is derived from thrusting a pointed stick at the legs, or into the body, of the unsuspecting victim. Grande again is mistress of this unpleasant art; spectators, dogs, and fowls are stabbed whenever an opportunity occurs. Why? Only street Arabs who ring bells at strange front doors and then run away, or do other such things, can perhaps give the true answer.

During the weeks in which this record was completed, it became the reigning fashion to stab the fowls. The method of procedure is so characteristic that it deserves a full description. I wish to state categorically that I have observed all the proceedings detailed below on several distinct occasions. When the chimpanzees are eating their ration of bread, all the fowls of the neighbouring estate assemble round the bars, presumably because crumbs sometimes fall through the wire meshes. As the chimpanzees take an interest in the fowls, they are in the habit of taking their meal close to the bars and gazing at the poultry, or frightening them away by a kick against the netting. Three forms of play have developed out of this, which I should not have believed possible if I had not observed them all repeatedly with my own eyes.

1. Between two mouthfuls of bread, a chimpanzee will sometimes hold his slice between the meshes of wire; a hen approaches to peck at the bread, but before she can do so, it is pulled back again. At one meal this joke will be repeated about fifty times. It is quite unmistakable. If one of the apes has no fowl in his immediate neighbourhood, he bends sideways with the bread in his hand and thrusts the bait towards one through the netting, and waits. Perhaps even the fowls would learn wisdom after a number of deceptions if at least *one* of the apes did not carry the game even further.

2. Rana, the most stupid of all our chimpanzees, really feeds the hens intentionally. There is no doubt about this. Suddenly, in the midst of the "tantalus" game, in which

she also takes part, she continues to hold out her slice, so that a hen can, and does, take several pecks at it in succession ; she gazes with lazy benevolence at the fowl. As she must feel each peck on her hand, and directly contemplates the fowl, holding the bread in position for it—until she herself wants to take another bite—one can really only use the term “feeding the fowls.” Some persons regard all the higher animals, and especially the anthropoids, with a certain suspicion and irritation ; they may be pleased to learn that Rana’s behaviour was a form of “play,” and not of deliberate altruism, that it did not occur very frequently, and now is being displaced by a further modification.<sup>1</sup>

3. This third game is as follows : the fowl is attracted to the bars with a slice of bread, but in the very moment when she is about to peck it, the free hand of the same chimpanzee (or of another beside him) thrusts a stick or—even worse—a strong pointed wire into her feathered body. When two chimpanzees take part in this (one as baiter and one as thruster) there has certainly been no previous agreement between them ; circumstances decree that the momentary activity of each happens to suit the other ; they realize it and continue their “collusion.”]

The habit of thrusting and hitting with sticks frequently develops into *throwing* them. In moments of great joy, e.g. when very good food has been provided, one animal often seizes another (or a human being, if present), shakes

<sup>1</sup> *Note added after this report had been completed* The procedure was observed again. It occurred as has been described above, only that first Sultan and then Tercera were seen to take slices of bread, throw them to the fowls, and then eagerly watch them feed. The act of throwing here was quite different from that described below (aggressive throwing) . instead of hurling with menacing gestures, a quiet strewing of the bread, while contemplating the fowls with fixed attention. I repeat that I was not prepared for anything of this kind. But there cannot be the least ambiguity about the facts or the nature of the “game” . It was not played with any food except the rather indifferent bread. I have described elsewhere (see Appendix) how the chimpanzees sometimes shared their food with one another.

him in his excitement, pretends to bite him, etc. In such cases Chica loves to take a stick and fling it vehemently at Tschego's ample back. This frequently happens in play. For some time Chica was in the habit of creeping up behind one of her companions as they sat quietly at rest—it was generally Tschego—armed with her stick, hurling it from the closest quarters, and then taking to flight. In addition to sticks, she used rolls of wire-netting, tins which lay among the refuse, handfuls of sand, and with special zest, *stones* of the most varied size and weight. A few days after we had taken over the station, Tercera climbed up one of the roof poles, armed with a stone, and aimed so well at one of the strange intruders that she narrowly missed his head. At that time, however, the throwing was far from expert, as with human children, it took some time to attain the right co-ordination of eye and hand, and Tercera especially generally missed her aim by a wide margin and often lost grip of her missile before she meant to do so. In the summer of 1915 stone-throwing became so much the ruling fashion that I have sometimes counted more than ten throws in the course of one quarter of an hour, most, it is true, by the same animal, the gymnastic expert, Chica, who learnt to aim excellently, and expressed her skill with equal delight against her fellow-apes and us. Others, again, did little or no stone-throwing. I have never seen Tschego do so, although she was a dangerous creature (owing to her size and strength) and could only be punished by us, if she bit or otherwise offended, by having stones thrown at her. But instead of flinging these missiles back at us, she seized them, and bit them viciously.<sup>1</sup>

The smaller apes were also of necessity driven back by throwing stones, when they could not otherwise be reached

<sup>1</sup> When the chimpanzee expects a stone to be thrown at him, he holds his arms over his head and turns his back. This protective attitude of the arms also follows any unexpected or terrifying noise, as of rockets or gun shots

as, for instance, when they broke out through a hole in the roof; but we took care not to hit them, only to frighten them. This consideration had the result that Chica collected the stones and returned them, with emphasis and aim. For, unlike the usage of sticks in thrusting and hitting, the throwing of stones tends to appear among chimpanzees as a form of attack, under the influence of rage. And, like ourselves, the chimpanzee does not only throw stones at objects that he can actually hit, but equally, for instance, at the bars, when a scolding human or a growling dog stand at the other side of them. His greatest urge at the moment, that is, to expend his accumulated rage in the direction of the offender, is thus gratified.

As we were sometimes compelled to throw stones at the chimpanzees, it is quite possible that our action may have influenced them in the same direction. But it would be a mistake to assume that the creatures were influenced by our action alone. In order to have a correct and adequate idea of the chimpanzee's use of tools, we must take into consideration the following cases.

Tschego did not throw stones. But when she was scolded, we could sometimes observe her stamping indignantly to and fro, throwing her head backwards and forwards, and not only shaking and clawing with her long arms in the direction of the scolder, but also seizing handfuls of grass and herbs, and tearing at them till the bits were strewn round her. If she had her blanket with her, she dashed it furiously on the ground, but always these gesticulations both physically and psychically, were partially directed towards the enemy, as were also the manipulations of the grass and herbs. One could not yet exactly use the terms "throw at" or "strike at", but the creature was obviously *approaching* the use of a weapon. The excitement which expresses itself by throwing and hitting the movable objects in the ape's vicinity

has naturally a tendency towards and against the object of anger. But I think it highly improbable that these *forms of expression* of anger are influenced by the contact with human beings. In such a state of primitive emotional excitement, all not *inherent to the chimpanzee's nature* is certainly completely discarded. The stone-throwing by the younger apes, which we had occasion to experience at first, also looked more like an explosion of anger than a deliberate attack with a weapon. It is quite in keeping that this explosion should be in the direction of the stranger : he is the " object of emotion ".<sup>1</sup>

Violent anger is however not the best medium for the observation of the very general behaviour here discussed. Weaker emotions, of longer duration than passing fits of wrath, are better able to evolve all their latent possibilities.

A chimpanzee was locked up alone in the cage. His companions did not come immediately to embrace and comfort him through the apertures of window and grating, in response to his howls and whimpers. He stretched his arms imploringly towards them, and, as they did not yet respond, he stuffed straw, his blanket, anything he could find between the bars or waved it in the air but always in *the direction of his mates*. Finally, in the extreme of distress, he threw one of his available pieces of property after the other towards the objects of his grief and longing.

Sultan was isolated and had to fast a little in the interests of science. He sat moaning in his prison while the rest devoured their food. Presently he concentrated his laments and entreaties on Tschego, who squatted near him, armed with a huge bunch of bananas, and who, on other occasions, had risen and approached to share her superfluous goods with him. He howled and held out his arms towards her.

<sup>1</sup> Since then (in 1916) I have observed all shades of explosive actions with various implements up to complete *armed attack* on an enemy in a small, but very lively, young orang-outang female.

She turned her back on him and he began to jump up and down and scratch his head. Still she did not come. He knocked upon the wall and the ground outside his cage, stretching his body towards her as far as he could reach. Finally, he caught up turf and straws, and angled in the air towards her, and then pebbles which he threw, not to hit her, but towards her, so that they fell near her.

Fruit had been placed outside the bars, as in many other experiments. But Sultan had no stick of sufficient length. He grasped vainly at the bananas and only relinquished this vain attempt after some time. His hunger increased; he seized twigs and pushed them towards his coveted prize; finally, he threw twigs, pebbles, blades of grass, and all available movable objects at the fruit, uttering plaintive cries the while.

In all three cases the animal does not by any means necessarily, or even generally, end by a burst of helpless fury. The creatures are not angry, but full of yearning and desire.

Accordingly, a wish or urge directed somewhere *in space* and long unfulfilled, does inspire actions *directed towards its object*, with little attention to practical utility. Certainly Tschego might have been moved by Sultan's behaviour, but as an unattainable fruit is treated in the same way as Tschego, a purely *utilitarian* interpretation will not suffice. It follows that, under the influence of strong, unsatisfied emotion, the animal must do something in the spatial direction in which the object of his emotion is situated. He must somehow get into touch with this objective, even if not practically, must *do* something, even if it is only to hurl the movables in his cage towards it. All emotions directed towards objects in space have the same quality (cf. above anger).<sup>1</sup> It is not

<sup>1</sup> In fear, as is well-known, the direction of action turns definitely right about 180°. Many animals will rush along terrified directly in front of a motor, as if they had to follow lines of force, when a slight swerve to right or left would save them.

the place here to show how human children show the same reactions, and adults too, when habitual inhibitions yield to extreme emotion.

Chimpanzees make nests from early infancy onwards. The full-grown female, Tschego, did the best and most remarkable work in this line. If, in the evening, she found straw heaped in a pile on her sleeping-board, she would sit on it, bend a handful slantwise from the edge towards the inside, and seat herself, or at least put her foot, on the twisted end; she would go on in this, working all round until she had formed a nest something like a stork's. The blanket was often roughly woven into it, though rather used as a cover on cold days. The nests which the young animals make are much more untidy and loose; and there is usually no turning down of the edge. If, on any occasion, they take a little more trouble, their movements during the preparation of the nest are exactly like Tschego's and these by no means depend on the material used.<sup>1</sup> Nests are often built during the day for fun, or at least are sketched out; a great many different materials, such as straw, grass, branches, rags, ropes, even wires are collected and used, not when a nest is needed, but the shapes are suggested when the material is available. It may be noted, for instance, that loose green food, whether twigs growing near the animals, or brought to them already cut for them to eat, is diverted on its way to their mouth and laid down, as it were, as the beginning of a nest. It cannot be said that this looks very intelligent: one is even reminded sometimes of some stupid habits of the chimpanzees described later, or of "fixed ideas" in human beings. In any case the behaviour of the same animals is quite different when they are clearly solving a problem. If

<sup>1</sup> The little ones can only have seen Tschego building a nest at the beginning, and then on rare occasions, when they had no opportunity of imitating her. I am of the opinion that they do not need an example at all.

the material under consideration is anything like stalks or twigs and if there is little of it, then we are confronted with the strange phenomenon that, whatever the circumstances, the first thing is never to make even a scanty support for the body to squat on, but to create a ring round the animal; this is always done first, and if there is not enough material, then the ring is the only thing that is made. The chimpanzee then sits contentedly in his meagre circle, without touching it at all, and, if one did not know that this was a rudimentary nest, one might think that the animal was forming a geometrical pattern for its own sake. If a tree with foliage be set up in the animals' playground, after a few moments the nest-making begins by bending in the branches, and pressing them down with the weight of the body (compare the above), as necessarily as a chemical reaction. Koko, the tiny one, who had been away from Africa and the example of other chimpanzees for months, when he could yet hardly climb a tree, would still, when three metres up, bend down the branches and begin building a nest at once. Thus, in this case, we may speak of the manifestation of a special and elaborated "instinct", whilst chimpanzees do not, as a rule, show many other signs of behaviour which could be called by the name of this utterly unexplained riddle.<sup>1</sup> In any case this is not the species of animal on which to begin such investigations.

They are fond of carrying quite widely different objects about on the body in one way or another. Almost daily the animals can be seen walking about with a rope, a bit of rag, a blade of grass or a twig on their shoulders. If Tschego was given a metal chain, she would put it round her neck immediately. Bushes and brambles are often carried about in considerable quantities spread over the

<sup>1</sup> Birth and the care of sucklings in chimpanzees has been but recently investigated. (See *Ber. d. Preuss. Ak. d. Wiss.*, 1921.)



whole back. In addition, string and pieces of rag are to be seen hanging in long strings over their shoulders to the ground from both sides of the neck. Tercera also has strings running round the back of her head and over her ears, so that they dangle down both sides of her face. If these things keep on falling down, they hold them in their teeth or squeezed under their chin, but, whichever way it may be, they must have them dangling. Sultan once got into the habit of carrying about empty preserve-tins, by taking the side that was open between his teeth. Chica, the sturdy, at one time took a fancy to carrying heavy stones about on her back; she began with four full pounds and soon reached a ponderous block of lava weighing nine pounds.

The meaning of these things can be seen clearly in the circumstances and behaviour of the animals. They play, not only with the things they have hanging round themselves, but, as a rule, with other animals' also, and their pleasure then is visibly increased by draping things round themselves. It is true that one often sees an ape walking about alone and yet draped, but, even under these circumstances he is mostly impishly self-important or audacious, as on the occasion when a decorated chimpanzee, with all signs of being in the best of tempers, will strut about among his companions or advance upon them menacingly. The adult female, Tschego, was often thus festooned when she trotted round in a circle with several of the smaller animals, quite at ease, tossing her head up and down, her mouth wide open, and, unlike the occasions when she was preparing to attack, all her muscles relaxed. That the whole company was playing could not be doubted by anyone seeing them, marching in a circle, one behind the other, the big animal stamping its foot violently at every step, or every other step,<sup>1</sup>

<sup>1</sup> That Tschego begins to *elaborate* the march *rhythmically* when playing in a circle is certain, as also the fact that in other cases she cares more for the form of the movements of the body, while rhythm occupies a secondary place.

and the others exaggeratedly accentuating the marching movements. At the time of this fashion, Sultan also used to carry his tin pot chiefly in his mouth, whenever he went, in a playfully threatening attitude, towards one of his companions or towards spectators on the other side of the bars.

[I observed an example, one evening, in which there was no sign of mirth and play, when Tschego, who had not been brought to her resting-place at the usual hour, had to remain outside by herself, while it was getting darker and colder. She began to build a nest as a matter of course, but ever and again would feel uncomfortable and lope about the ground uneasily; finally she carefully picked up everything she could find in the way of dry leaves, twigs, etc., and put it on her back. All the time she was in the worst of tempers.<sup>1</sup>]

No observer can escape the impression that, apart from Sultan's tin pot and Chica's athletic block of stone, which leave strong room for doubt, the objects hanging about the body serve the function of *adornment* in the widest sense. The trotting-about of the apes with objects hanging round them not only looks funny, it also seems to give them a naive pleasure. Naturally we can scarcely assume that apes have a visual image of what they look like when dressed up like this, and I have never observed their frequent use of reflecting surfaces as in any way connected with their adornment; but it is very likely that primitive adornment like this takes no account of external effect—I do not give the chimpanzees credit for that—but is based entirely on the extraordinary *heightened bodily consciousness of the animal*. It is a feeling of stateliness and pride, feelings, indeed, which occur also in human beings when they decorate themselves with sashes or long tassels knocking against their legs. We raise our

<sup>1</sup> Cf. also Appendix, Reichenow, *Naturwissenschaft* IX, p. 73 seqq., 1921.

own opinion of ourselves by self-contemplation in front of mirrors, but the enjoyment of our splendour is not dependent on the looking-glass, on visual images of our looks, or on any other visual impression ; *when anything moves with our bodies, we feel richer and more stately* <sup>1</sup>

[Sultan, with his tin box in his mouth, often utters dark sounds, when he comes up towards other animals or men, sounds which echo still more hollowly in the empty box. If any doubt remains here that the acoustic effect of the box was noticed, and then used on purpose, it certainly must have considerable significance if some of the animals, in a state of excitement, will drag boxes, tin drums, and so forth, behind them on the floor, and rattle them tremendously when running up against any person, or even a wall (cf., for instance, p. 47). Grande, in particular, does this. In all sorts of circumstances, but sometimes without any apparent reason at all, she will put herself into quite a terrific state of excitement ; she gets up, her long fine hair streaming in all directions, so that she looks like a black powder-puff, seizes the box or the tin in her hand, stamps from one leg to the other with glittering eyes, and bent forward a little, setting her arms, and possibly the instrument also, rhythmically a-swing, and, after sufficient preparation, suddenly rages at other animals, men or walls. If the animal is walked over, the man has stepped aside, or the wooden wall has received a thundering kick, then her bristling fur settles down and her fury is spent. In this case the noise most certainly has some meaning ; for the same animal, when pretending to be cruel or terrible (in reality Grande is the most kind-hearted of souls), stamps loudly on a box, or, on the other hand, one can enrage her tremendously by making any noise, especially

<sup>1</sup> H. Lotze, *Mikrokosmos*, treats of similar points, only he talks of a top-hat, which the chimpanzees would certainly also make use of with joy.

by drumming on a box. As a matter of fact, the others will often get similarly enraged, but their fury never takes so dramatic a course as Grande's ; she, at her best, would rush along, hair bristling, arms rigidly stretched out like a ship in full sail ; she could succeed, in this guise, in giving a real shock to inexperienced observers (compare p. 86).]

A thing very probably related to this ornamentation is the carrying of all sorts of things between the lower abdomen and the upper thigh. The apes not only keep food there, when they need their hands for climbing or have too much to carry, but also, for no particular reason, pieces of wood, stones, rags, and all kinds of objects, which may give pleasure to the animals. Tschego, in particular, ran about for whole days with an object wedged in this spot which she never let go, even when she sat down to rest. Once, it was a red rag which she would not remove from her lap, another time, a round stone polished to smoothness by the sea. Once I gave her a photograph to see what she would do ; she looked at it for a while, felt it all over with her big fingers, and then put it in her "trouser-pocket".<sup>1</sup> Once a thing is put there, it is hard to get it again. For instance, the animal looked after the smooth stone most carefully ; if she had squatted on the floor, she would press it firmly and carefully when she got up to change her place ; on sitting down again, she would feel it and turn it round ; on no pretext could you get the stone away, and in the evening she took it to her room and her nest.

To say that a game is again in hand does not altogether cover this case. For it is noteworthy that the region of the lap in a chimpanzee often signifies *much more than the geometrical* centre of the body, although the sex organs (in the female at least, and therefore in Tschego) are placed towards the back, so that they form more the termination of the back

<sup>1</sup> Cf Appendix, p 325.

than part of the lap. When, for instance, a small animal greets Tschego, it generally (there are a few other forms of salutation) puts its hand in the bigger animal's lap; if the movement of the arm does not go so far, Tschego, when in a good mood, and particularly when it is her friend Grande, will take the hand of the other animal, press it to her lap, or there pat it amicably. She will do exactly the same to us when she is feeling amiable, that is, she will press our hand against just that spot between her upper thigh and lower abdomen where she keeps wedged her precious objects. She herself, as a greeting, will put her huge hand to the other animal's lap or between their legs and she is inclined to extend this greeting even to men.

To see anything nasty in this habit, is to mistake the entirely innocent character of these animals. The animals in the zoological gardens, I am told, sometimes behave in a very ugly manner; the chimpanzees of the station are, without doubt, very dirty creatures in the usual sense, in spite of the care that they devote to each other's bodies, and are certainly very greatly "coprophagous", but their sex-cleanliness could scarcely be greater; I have only seen little Koko, while hopping about in a fury, but on no other occasion, happen to masturbate in a manner which must have originated accidentally under these circumstances.

To this remarkable part of his body, then, its inmost spot, so to speak, when the chimpanzee squats in his usual negro fashion, does he clutch his property, and it is quaint to see how even the oldest animal, and the most difficult to influence, will always keep there any valuable he possesses, particularly rags and the like.

Once, when lumps of white clay were brought to the playground, the animals gradually began to paint, without any stimulation, and whenever afterwards they again got clay, the same game would begin. At first the chimpanzees licked

the unknown stuff, very likely they wanted to see how it tasted. The result being unsatisfactory, as usual in similar cases they wiped their protruding lips on the nearest object they could find, and, of course, made it white. But, after a while, the painting of beams, iron bars, and walls, grew to be quite a game on its own; the animals would seize the clay with their lips, sometimes crush it into paste in their mouths, moistening it, and would then apply the mixture, make fresh paint, and daub again, and so on. *The point is the painting, not the chewing of the clay*; for the painter himself, and the rest of them, when not too much occupied with their own affairs, are most interested in the result. Soon, as is to be expected, the chimpanzees stop using their lips as paint-brushes and, taking the lumps of clay in their hands, whitewash their objects much more quickly and firmly. Of course, they have not yet achieved more than big white blobs, or, when particularly energetic, getting a whole beam-surface whitened. Later on the animals should have been given other colours. Once Tschego very patiently painted her legs all over, but on her dark fur the effect was not satisfactory.

Through this moistening and painting, the animal's whole mouth, of course, soon becomes white. But while, when decked with all sorts of adornments, the animals become playfully self-important and pleased with themselves, when their faces are whitened, they behave exactly as usual; so that the white face is a mere by-product of the animal's activity which it very likely does not realize itself.

The chimpanzee's methods of dealing with external objects has been sufficiently described for the present; a few observations relative to plating, the use of keys, their behaviour with reflecting surfaces, are given in another connexion. Ethnologists will seize immediately upon what is of interest for them without further emphasis.

