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THE NATURAL HISTORY OF ANALOGY.[1]

BY the natural history of analogy is meant the treatment according to the methods of natural science of a type of mental action interesting at once as a psychological process, and again from its practical results as a factor in the anthropological history of the race. While logically an analogy may be defined as an inference of a further degree of resemblance from a given degree of resemblance, it would be well to include in the present survey types of argument diverging somewhat from the standard. It should also be borne in mind that these reasonings may be unconsciously conducted without analysis, and yet be communicable from mind to mind, and influential in the fixation of belief and the guidance of conduct.

It will appear that the progress from the attitude of the savage to that of the civilized man with respect to the understanding of the natural and physical world, may, to a considerable extent, be regarded as a shifting of the position occupied by the argument by analogy. It would appear, too, that this form of argument, used by the scientist of to-day only with the greatest caution, is a predominant one in more primitive forms of thought. For example of such arguments we turn to three departments of mental action, closely related to one another, and each contributing to the value of the general results. We look first amongst the customs and beliefs of primitive people, then amongst the doings and sayings of children, and thirdly amongst that very extensive class of superstitions and folk-lore customs which no nation, however high or low in the scale of civilization, is without. The Zulu chewing a bit of wood to soften the heart of the man he wants to buy oxen from, the Illinois Indian stabbing the figures of those whose days they desire to shorten, the operation upon a lock of hair or the parings of the finger-nails, together with the endless forms of primitive witchcraft, rest upon the notion that one kind of connection will bring with it others. The same idea underlies the customs directing and prohibiting the use of certain food. The Malays eat tiger to acquire the cunning of that animal, the Dyaks refuse to eat deer for fear of becoming faint-hearted, and in the Mexican rite called the "eating of the god" is found an elaborated form of the same belief.

The interpretation of omens among primitive people also proceeds by analogy, the relation between omen and issue being guided by a sense of analogical fitness. To determine whether war is to be upheld or let fall, a stick is set in a bowl of rice, and if it stand the war is continued, and if it fall the war is let fall also. A somewhat less direct form of analogy appears in customs relating to images and names. The name becomes an essential part of the thing, and thus what is done to the name will affect the thing; hence the origin of the taboo, changing of the name in case of sickness, and the like. Even vaguer and more general principles of analogy may underlie important customs, such as that things go by contraries, for example, or that to produce unusual effects, drastic means and rare substances must be employed. The bizarre fancies, the grotesque performances, and the uncanny pharmacopœia of the medicine-men in part derive their character from this source. All these are but partial illustrations of the savage's fondness for the use of arguments by analogy and the naturalness with which he observes and assimilates all phenomena according to this habit.

The study of children reveals evidence of similar arguments, although the earnestness of the belief cannot be so readily tested. Moreover, we have no good collection of children's sayings and doings for such examples. In spite of this, however, their fondness for analogical arguments may be regarded as an additional point of resemblance connecting the infancy of the individual with that of the race.

The superstitions current among us — survivals from a culture which they are of to a culture which they are in — abound in instances of analogy, simple and complex. Especially fertile fields for such instances are the beliefs concerning dream-interpretation, those underlying the practices of folk-medicine, those connected with names and numbers, and, in more systematized form, the doctrine of sympathy, and signatures of astrology and kindred sciences. The modern cheap dreambook is full of quaint arguments by analogy. Whan it tells us that to dream of gloom means imprisonment, that the pine-apple in dreams is the omen of crosses and troubles, that to dream "of being mounted on stilts denotes that you are puffed up with vain pride," to dream of onions indicates the betrayal of secrets, to dream "of a dairy showeth the dreamer to be of a milksop nature," and that a zebra indicates a checkered life, — we see what various and peculiar results may be reached by such logic. The many customs and superstitions connected with such numbers as three, seven, and thirteen need but be referred to to show how thoroughly this variety of thought-habits is permeated with the argument by analogy.

The remedies of folk-medicine easily reveal the analogies through which they originated. The connection of toads with warts is due to nothing more than the warty appearance of the toad's skin; the snail is used for ear-ache because of the many snail-like passages in the ear, red things are used for fevers, yellow things for liver complaints, and many of the peculiar and disgusting remedies of our forefathers clearly imply that out-of-the-way substances must have special efficacy.

[1] Abstract of an address before the Section of Anthropology of the American Association for the Advancement of Science, at Washington, D.C., Aug. 19–25, 1891, by Joseph Jastrow, vice-president of the section.

The doctrine of signatures depends on the notion that the appearance of plants signify their use. The eye-bright, on account of the eye-like spot in its corolla, is used for eyes; the granulated roots of the saxifrage indicate its use for calculous complaints; the human shape of the roots of ginseng give it special efficacy; and the walnut, the parts of which so closely resemble the skull and brain, is marked out for the mental diseases. The doctrine of sympathies has appeared under various forms, and has quite an important history. The common phrase, "Take a hair of the dog that bit you," is a survival of this system, and shows that the logic underlying it is nothing more than that two phenomena once connected, either by coincidence or as cause and effect, will continue to maintain this connection. Paracelsus describes a peculiarly composed weapon-salve which was to be applied to the weapon that caused the wound and thus heal the wound. Sir Kenelm Digby's practices involve the same notion. He procured a handkerchief or other personal belonging of the patient, and when this was dipped in water, the fever abated, and the like. The sympathetic alphabet was another form of this doctrine. Two friends each cut a piece of skin and grafted it on the skin of the other; on this was tattooed an alphabet, and communication was established by the belief that pricking a letter on the skin of the one friend would cause a pain in the corresponding place of the other. Even in the present century two Frenchmen announced the discovery of a species of snails which, however widely separated, would go through the same movements, so that if the one is guided over an alphabet the other will rest upon the same letters.

The most systematic of all these pseudo-sciences is astrology, the analogies underlying which being of all grades of remoteness. The system of correspondences which it proposed gave unusual opportunity for flights of imagination, and no analogy, however far-fetched, was too slight for the foundation of some doctrine. The accident by which the planets were given the names of deities was sufficient to connect the characters of those deities with the lives of persons at whose births these planets presented especial relations. Similarly the fact that constellations were named by fancied resemblances to certain animals was sufficient to connect one's career with the qualities of that animal; thus a child born under the sign of a lion would be courageous, but one born under the crab would not go forward in life.

Amongst the various generalizations upon which these considerations have bearing, attention will be called to the following. The history of the argument by analogy adds another link to the chain of evidence by which the development of the individual is connected with that of the race. We trace similar appearances amongst savages, amongst children, and still more strikingly in those surviving forms of superstition and pseudo-scientific systems which we are warranted in regarding as reversions to more primitive types of thought. Again, the principle that what was once the serious business of adults serves in more advanced stages of culture for the play of children or the amusement of leisure hours, finds illustration here. Just as the drum, once the terrifying instrument of the warrior, or the rattle, once the potent implement of the medicine-man, has become the toy of children, or as the bow and arrow are maintained for sport only, so the outgrown forms of thought, the analogies, that were serious to our ancestors, now find application in riddles and puns. When we ask, "Why is this one object like another?" we are asking for just such out-of-the-way resemblances as have been noted above. And, finally, in a variety of ways, the consideration of the argument by analogy adds to our appreciation of the unfoldment of mental powers, of the slow and painful steps by which the tenets of modern science have been gained, of the necessity for continued striving in this direction, as well as of the underlying unity of movement and design by which these phenomena acquire their deeper and more human interest.

THE ETHER.[1]

IT was with some fear and trembling that I selected as the subject of a brief address a subject of such vast dimensions, and the feeling increased as it became more and more evident how difficult it is to give clear expression to ideas that are very far from clear.

In former days many reasons were given showing the necessity for the existence of an ether which do not seem conclusive now. We can scarcely appreciate the bearing of an argument to the effect that there must be an ether or nature would be disgusted with the major portion of space. We should begin at once to wonder what there could have been in the experience or training of any person that could lead him to such a conclusion. We do not see the need of an ether to hold up the stars and planets and prevent them from falling to the ground. We do not try to explain by similar means how the planets are kept in motion.

We do, however, have other needs for ether, which seem important and pressing; still we cannot help wondering occasionally, with Theophrastus Such, what kind of hornpipe we are dancing now. How will our ideas commend themselves to those who follow?

For many years it was taught that the luminiferous ether was an incompressible jelly-like mass, and that light is an elastic pulsation in this medium. The elastic theory, however, was burdened with serious difficulty. No phenomena corresponding to a vibration normal to the wave front could be found, but mathematical analysis showed that such waves should in general exist in an elastic medium. Green saw that this wave would produce no optical phenomena if the velocity were either zero or infinite, and concluded that it could not be zero in a stable medium. Those who followed him in time also accepted his conclusion that the ether was incompressible, and that the compression-rarefaction wave must travel with an infinite speed. So the matter stood until 1865, when Maxwell proposed an electro-magnetic theory of light. According to this theory of light no compression-rarefaction wave should exist, and light was conceived to consist of local electrical displacement in a plane at right-angles to the line of propagation.

The rival theory met with great favor. It gradually became clear that Maxwell's theory of light was attended with less difficulty than the elastic theory. Twenty-three years later, Sir William Thomson brings a powerful reinforcement to the elastic theory which changes the whole aspect of the case. He simply suggests that the compression-rarefaction wave could properly and logically be gotten rid of in the elastic theory by making its velocity zero, instead of infinite, as Green had done half a century before. What Thomson did was to examine anew the ground upon which Green had concluded that a zero velocity for the compression wave involved an unstable state of the medium, and it was found that such a conclusion did not follow.

[1] Abstract of an address before the Section of Physics of the American Association for the Advancement of Science, at Washington, D.C., Aug. 19–25, 1891, by Francis E. Nipher, vice-president of the section.