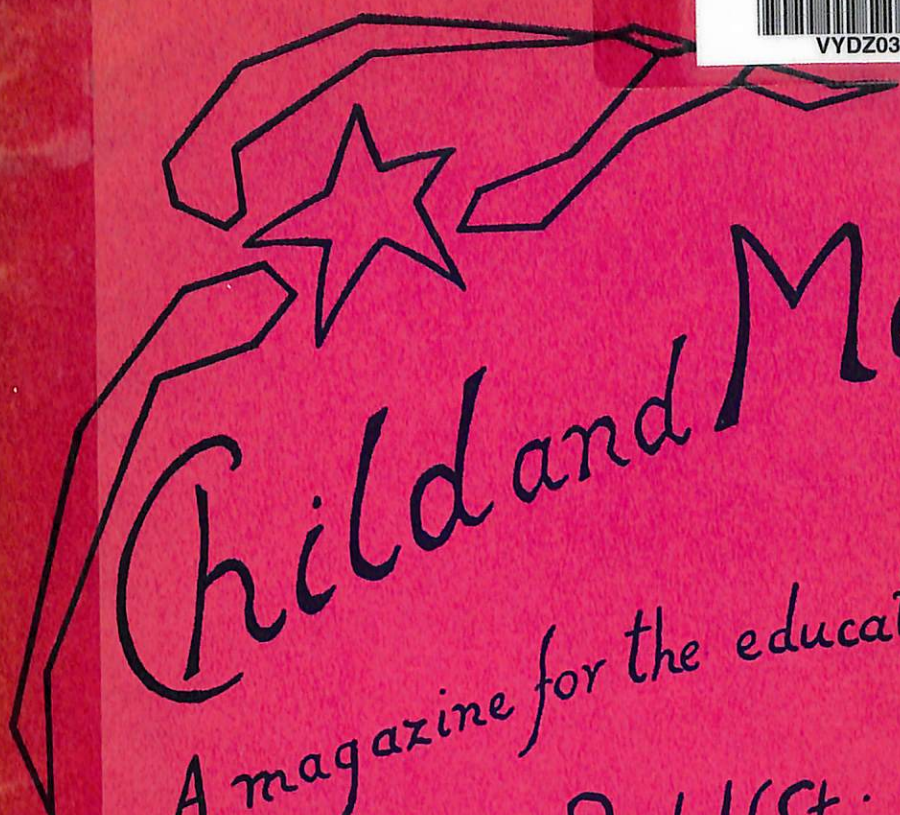


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Child and Man

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HEAD OF A CHILD
By a child of sixteen

CHILD AND MAN

Edited by A. C. Harwood

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Editorial

THE editor apologizes to subscribers for the late appearance of this number. The extension of the School, culminating in the opening of the new building and the change of the School's name to Michael Hall, has so taxed the energies of the teachers that it has been difficult to find time for other work. To make amends, the present number appears as a double one.

Epic, Dramatic, and Lyric Poetry

LITTLE children have often the greatest delight in the beauty of sound and rhythm in poetry; for them the meaning is a secondary thing, and it can be a great delight to children who have learnt beautiful poems by heart when they were still young to discover as they grow older more and more of the meaning in what they have learnt. But

a serious study of poetry is not possible with children till the age of puberty; for poetry, even when it appears to delight most in natural description, in reality concerns itself deeply with things of the human soul, and it is not until the inner qualities of the human soul manifest themselves with the change of puberty that children have any real understanding for the content of the masterpieces of poetry.

It is one of the beautiful laws of Anthroposophical education to endeavour to help the incarnation of the human spirit into the developing human body, to make the transformation of Nature into Human Nature as complete and harmonious as may be. Every time a human being makes this change in his thoughts in one particular sphere of life he harmonizes himself with the true law of life; and every time a child can follow in thought the process by which humanity has left behind the instinctive connection with Nature, and developed the older instinctive Nature forces into conscious human powers, he prepares a way by which the riches of Nature can be transformed into riches of the human soul. One such path can be found if we trace with children the progress of epic, dramatic, and lyric poetry.

In this "progress of poesy" it is first of all most important to establish the fact that human speech begins in a rhythmical form. Indeed, it might be taken as a kind of test of his outlook on life to ask a child whether poetry was the first literature, or whether man first of all composed in prose, and rhythm was the invention of a later and cleverer age? To-day men find it easy (only too easy) to write in prose; we have to give the children a feeling for an age in which to have composed in prose would have been not merely difficult but impossible. But we must do this not simply in a general, but in a concrete way; for children, especially at this age, have an excellent gift of rejecting general truths (especially if they suspect they are being preached at) and clinging to the concrete and particular. Many an adult who has been worsted in an argument (into which he should never have allowed himself to be drawn) by the appalling cleverness of children of this age will find the reason for his defeat lies in the fact that the child has stuck to the case in its most insignificant detail, while his own thoughts have been sicklied o'er with generalizations.

We can, perhaps, approach the question from some such point of view as this. We know that the great cycles of Epics of ancient days were not written down, but were remembered by heart. Homer, for example, was not written down till the age of Peisistratus—and modern people who would find it a burden to learn a hundred lines of poetry may well ask themselves how the ancients could remember such hundreds and hundreds of cyclic Epics. This, however, at once raises the whole question of memory: how do we in reality remember? It is interesting to ask children *where* they remember something. Some children—and most adults—will reply in their heads; because in the consciousness of the nerve senses centred in the head lies the characteristic experience of man to-day. Everyone, however, will have had the experience that when he has forgotten something, for example a name, the more consciously he tries to remember it, the deeper it sinks into oblivion; then he passes on to other things; and suddenly, in a moment when his attention is on something quite different, it wells up from the depths, and behold, he has it! But where does this memory come from? From the "unconscious" says the psychologist. Yet what is this unconscious, and how does it retain the impression of the past?

Memory presents many unanswered riddles at the present time; the sudden forgetting or remembering of whole tracts of life in illness or disease; the fact that old people often remember most clearly the days of their earliest childhood while they forget the middle part of their lives; or that wonderful phenomenon to which many people who have been very close to death have borne witness, the spreading out of their past life as in a picture in space to be comprehended in a moment of time; or the frequent association of memories with particular physical experiences—a smell, a touch of a certain quality, a position, a taste. Rudolf Steiner has given a comprehensive account of memory, satisfying to all its problems, which can only be given here in epitome. When we experience something through the nerves, or through our own thought-life, the experience does not immediately vanish, but is received by our time-body (or etheric body) which permeates our physical body during life and keeps it from the dissolution which overtakes all organisms when at death this time-body

separates from the physical. This time-body (etheric body) is, however, the formative principle which builds and maintains the body and its organs, and the experience we have undergone is built by our time-body into the forms of our inner organs, more especially, with regard to certain memories, into the forms of the heart. We sometimes marvel that such a thing as the thumb marking in the human body is individual to every living man: it is even more marvellous that the finer differences between heart and heart should be an impression of the difference between two life experiences. But in reality, when we remember some particular thing, we are perceiving it by an inward looking just as we perceive by an outward looking when we use our sense powers on the world around us. To this connection of memory with organs other than the brain and nerves a phrase in our language (well known to children) bears witness: learning by heart. It was in the days when the forces of the heart, and not of the head, were predominant in human life that the power of memory was so strong.

If, then, we picture to ourselves an ancient bard singing his songs, we must conceive that it would have been quite impossible for him to stand up and recite his poems as a modern reciter would do: he had first to take down his harp from the peg in the wall of his Lord's Hall, and, holding it against his heart, bring himself and his hearers into a certain rhythm out of which the poem could be reborn. This rhythm, however, which was sustained throughout an entire epic poem was of no arbitrary kind.

We can take, for example, such a characteristic rhythm as the Hexameter in which the Homeric poems were formed.

"Sing, Goddess, Sing me the wrath of the mighty hero Achilles. . . ."

The Hexameter which William Morris has copied for his noble version of Sigurd the Volsung is equally characteristic.

"There was a dwelling of Kings ere the world was waxen old. . . ."

In the Hexameter there are the six beats in the words themselves which give the rhythm its name. But in reality there are two more; for a pause at the end of every line, and a break at the middle of every line (an unfailing law in the Hexameter) make two more silent beats, silent in the words,

but perhaps emphasized on the strings. We have therefore in reality in the Hexameter a double-four rhythm, and one beat in four is represented by a pause in the words. But this rhythm of one to four is given to the singer not by an abstract law of poetry, but by the forces of the human heart against which he holds his lyre. For the heart rides upon the diaphragm as a rider rides upon a horse, and as the diaphragm rises and falls with every intake and output of the breath the heart harmonizes its rhythm with the rhythm of the breathing. Every runner knows the importance of this harmony between the beat of the heart and the breathing, and the misery of exhaustion which precedes the readjustment of this harmony which we call "second wind." Now the normal rhythm of breathing to the rhythm of the heart is the rhythm of one to four: in the Hexameter we have a revelation of human rhythm—the four heart-beats to the one process of the breath. Out of the forces of the heart the epic poem was drawn.

Nor is this rhythm only a human one; the rhythm of the human heart is in reality a reflection of the great rhythm of the sun—for man is a microcosm, and all processes in man are epitomes of the vaster workings of the Universe. To take but one example from many which Rudolf Steiner has given in connection with the heart and breathing: during the year's revolutions of the heavenly bodies as seen from the earth the sun is continually changing his relation to the fixed stars. The fixed stars are, as it were, always falling behind, and every month they fall behind one-twelfth of the circle of the heavens. In the space of a year, therefore, the sun has travelled with all the signs of the Zodiac in turn and reached the position from which he started: but not quite the same position—for there is a slight variation, so that when a full year is completed the sun is slightly in advance of his position of the year before. There is, therefore, not only a yearly rhythm in the relation of the sun to the fixed stars, but a greater one as well; and the number of years which go to this great year is the number of the breaths which at the normal rate of breathing a man breathes in a single day: for we draw on the average eighteen breaths every minute, and the number which this gives every day, 25,920, is actually the number of years of

the Great Year in which the sun makes the circuit of the heavens.

If, then, we endeavour to picture a Homeric bard entering upon the singing of an epic cycle, we must picture him with the lyre held against the heart, as he wakes in himself and in his hearers the rhythm which the human heart echoes from the rhythm of the Universe. And how does his song begin?

"Sing, Goddess, Sing me the wrath of the mighty hero Achilles." It is not he who sings; it is a universal power, a being of the heavens who inspires in him both the rhythm and the song—it is the Goddess, the Muse, who is invoked at the beginning of every true epic. The Divine Muse was not a figure of speech to the epic poet; she is to be found in the very rhythm which kindled him to song.

The content also of the true epic poem is true to the human-cosmic nature of the rhythm: it must essentially deal with an action in which heavenly powers intervene in human actions; in which, indeed, the human actions have only meaning in so far as they are directed by the will of the Gods. It may be the Gods in Olympus debating the fate of Troy and Athens, or it may be Odin, "one eyed and seeming ancient," walking the earth to bring man to his destiny; in the true epic there is always the impression of the Gods as fate, irresistible and unresisted, leading the action along its inevitable path. But once an age of drama begins something new has set in. There is protest against fate, there is questioning of the will of the Gods, there is an answering life in the independent human soul. One of the most favoured themes of the Greek dramatists, for example, is the theme, generally represented in a trilogy of plays, of the blood-guilt and expiation of Orestes. Clytemnestra having murdered her husband Agamemnon on his return from Troy, her son Orestes is commanded by the oracle of Apollo to kill his own mother in expiation of his father's death. After the deed he is haunted himself by the Avenging Spirits, who demand his blood in return for his mother's. In the background of the play is a record of guilt calling for punishment handed down from father to son for many generations. The solution of the problem (to modern minds not altogether satisfying) is that Athene intervenes, summons a meeting of the Court of the Areopagus in Athens, and, having

by her casting vote declared Orestes innocent, abates the wrath of the Furies, and so breaks the chain of blood-guilt.

It is not easy for modern minds to appreciate the extraordinary significance of this drama and its solution to the Greek audiences who witnessed it. There were always two elements in the Greek drama: the actors themselves who in the earlier plays did not number more than two or three and were not the most important element in the drama, and the Chorus who recited with a kind of eurhythmy movement a description of the action and a commentary on it. What is this Chorus? It is the epic element, carried into the dramatic age. Its origin is supposed to have been when the circle of hearers at the singing of some epic hymn in praise of a god at his festival, no longer content with listening, broke into a sympathetic dance as an accompaniment to the epic song. In the same way many mediaeval plays (for example, the Oberuferer Nativity and Paradise Plays) are so formed that the scene is first described in song by the company and then that particular part of the action is performed. Thus the epic element passed in a more dramatic form to a group of singers: the sweep of the hands on the harp becoming the dance-eurhythmy gestures of the Chorus, the single voice of the bard the concert of many voices together: and at the same time, usurping the high place of the single epic singer, arose the two, three, or more actors who enacted the scene in the intervals of the choric songs. If we take such an early drama as the trilogy of Aeschylus dealing with the theme of Orestes, we find a very interesting relation arising between the Chorus and the actors. The theme of the blood-guilt is a theme which deals with man as belonging to the natural rhythm of the world—father, son, father, son—in which action and passion pass quite naturally from generation to generation. This theme is therefore specially given over to the Chorus, whose task it is to remind the audiences of all the previous crimes committed in the generations of the family—the murder of Iphigenia, the eating of his own children by Thyestes, and so forth. That is the epic part of the story. But the essentially dramatic part of the play provides the element which works against the blood-stream, the advent of Athene, the Goddess who sprang without mother from the head of Zeus, and who

awakens in man the power of thinking which is the individual manifestation of the spirit, and not like the old clairvoyant knowledge dependent on the stream of the blood. Orestes is saved by Athene: follow Athene and you will become free from the stream of heredity. You will know yourself—that is one of the first great messages of the first age of drama to the human race. No longer is all God-ordained. Humanity is free enough for the deeds and thoughts of one man to find a varying response in the deeds and thoughts of another man. There can be two actors, there can be three, and even more: Drama has begun, and with it the principle of individual human freedom.

It is an immense step in human evolution from the epic to the dramatic experience, and the step from the dramatic to the lyric is not less great. For it may be said that the age of lyric poetry does not begin until the renaissance. Not that there were no lyrics in ancient times, or no epics in modern times: but even the lyrics in ancient times tended to have something of an epic ring, and certainly one of the greatest epics of modern times is purely lyrical in character. Take the epitaphs in which Greek lyrical genius delighted, for example the epitaph on the Spartans who fell at Thermopylae.

Go, tell the Spartans, thou that passest by,
That here obedient to their laws we lie.

Such things are epics in miniature which cannot be reproduced or copied in modern language which has lost the heroic rhythm and the heroic ring. It would have been equally impossible for a Greek bard to sing of the developing individual soul as Wordsworth has described it in his *Prelude*. The *Prelude* has had such an immense influence on modern poetry and modern thought because, though in form an epic, it is a masterpiece of the lyrical spirit. It is the lyric poet who must seek the Kingdom of Heaven within him, and by the most sensitive attention to his own ever-changing feelings and perceptions rise at his greatest to the height where Nature and the Divine are mirrored in the experience of the human soul. Such a relation to his own soul is the necessary lot of every man in the modern age, and the poet must use what the age has given him. But it is a totally different experience of

life from that of the Homeric noble, or of the Athenian citizen.

Before the lyric age begins, however, the drama itself undergoes a complete metamorphosis. The fundamental theme of the pre-Christian drama is the escape of the individual from the law of the blind and inexorable chain of guilt and punishment. The drama which arises after the incarnation of the Christ is of a quite different order. Shakespeare's tragedies, for example, are fundamentally concerned with the destiny arising within a single human life.

It is a remarkable thing that the play of *Hamlet*, in some ways the most characteristic of all tragedies for the modern age, should deal with the same external situation as was presented to the Greek dramatists by the theme of Orestes. Both Hamlet and Orestes are called upon to avenge a murdered father on a guilty mother and her paramour—but what a world of difference in everything but the outer situation! Orestes is faced with two divine laws in contradiction: the command of Apollo to avenge his father, and the ancient Universal law of honour to the Mother—he does not doubt either law, but he cannot fulfil both. Hamlet *knows* no such divine law. He scarcely knows whether he believes in or believes his father's ghost, whether he can credit what he sees at the play as evidence of guilt: and if the guilt is proved what shall he do? But the inner evolution of humanity which has brought this new type of man into existence has also entirely altered the form of the drama. There is no Chorus in *Hamlet*, nothing but the action taking place on the stage. But when we remember the function of the Chorus in the Greek drama, to describe and comment on the action, to bring the objective epic view on to what is being done: then we can see that even in *Hamlet* there is the Chorus element to be found. Hamlet is himself his own chorus. He cannot *act* because he is for ever trying to take on the function of the objective observer of his own actions. The Epic is entirely objective in its nature. The divine formative principle, the Gods, forms as natural a part of it as the hero's helmet and supper: and the actors in it are in part conscious of their destiny, they accept their fate. In the Greek Drama the actors begin to act more out of subjective feelings, they do

not clearly know whither their actions will lead them; but the Chorus represents the conscious knowledge of fate such as pervades the epic age. The auditors, too, were never presented with a story unfamiliar to them: it would have been something like a pain to them to have watched actors unfolding a story without themselves knowing the "divine end" to which the story tended, of which the actors themselves were unaware. But in the stage humanity has reached by the time of Hamlet the Chorus has gone, and the actor must struggle to draw an objective consciousness of the situation out of his own self. Hamlet is such an overwhelming character for the modern age because he initiates the mind which struggles for objectivity through knowledge; and in the first phases of that struggle the will is paralysed, and the man loses control of the situation of life. The world is still at the stage of Hamlet: it sees plainly the tragedy and contradiction of life—plenty and poverty, desire for peace and preparation for war, incredible facilities for travel, and people shut within their frontiers—it sees all this, but it cannot act. It is acted upon by forces beyond its control.

In another respect also Hamlet is the prototype of the modern consciousness. We feel that as an artist his genius is essentially a lyrical one. He is intensely sensitive to his own feeling and experience in every momentary situation, and his tablets seem to hang around him for the recording of the lyrical utterance with which he fills the play. Hamlet ushers in the age in which the drama becomes a brilliant amusement and refreshment of the human spirit, but profundity of thought passes over to the lyric genius of mankind.

It is precisely because the lyric genius is the product of a more mature and complex humanity that it should come the last in order of study with children. First epic and its change into dramatic; then in a quite different year the whole question of lyric poetry. But always before the time comes for studying a subject, it is good to throw the children's minds forward to the future; and this article has been intended to indicate something of the way in which lyric poetry can be spoken of in its connection with epic and dramatic. With younger children also it is often possible to find a more external picture for what is in reality an inner movement of

the human soul. There is a quite extraordinary (though almost unnoticed) revolution in human thought which took place in our country with the beginning of the real age of lyric poetry in the seventeenth century. From earlier Christian times down to the later Middle Ages, the thought of immortality was constantly present to European mankind; but always in such a way that men thought of the life after death, and not of the life before birth. Just at the beginning of the seventeenth century, however, there arose a group of lyric poets (of whom Traherne and Vaughan were outstanding) who with the inward look into the human soul penetrated so far into the foundations of their own lives that they realized also the immortality before birth. The life of the human spirit in the spiritual world became for them not a matter of faith but of experience; they found a path by which the individual out of the powers of his own soul could unite himself with the Universe. This is, however, in a particular form the essential mission of the lyrical age of poetry—to unite the spirit in man with the spirit in the Universe. It is the seeking through individual powers of that union between man and the heavens which was natural to the epic age, and gave the epic poet both the vessel and the content of his song. But in the lyric age both content and vessel became individual—there is the search for new metres and strange forms: and even when two poets use the same metre, each pours a subtle rhythm into it which makes the contrast between them even more marked. Lyric poetry stands as the complement of epic, and the "Progress of poesy" reveals the essential course of the human spirit in its life on the earth.

CECIL HARWOOD.

Modelling

SMALL children delight in forming figures of men and animals, and all things that surround them or that occupy their imagination. Naturally they do not experience form as adults do, but in conformity with the development of their souls they experience above all movement, a dynamic power. They inwardly imitate movement, which flows as formative force into their hands. That is the

reason why little children can impart such deliciously characteristic gestures to all the things they fashion with their hands. It is easy to see that the power with which they observe and then create is not an intellectual power, but the result of an interaction of sense observation and will activity. The children naturally find a very good outlet for their yearning for movement in the sphere of modelling—it is an essentially constructive activity, bringing the blood into thorough movement right into the finger-tips.

All constructive work is blood activity, all destructive work nerve activity in the first place—it is therefore not too much to say that the activity of modelling works against the destructive element in children. This element should, of course, not be confused with the natural tendency of small children to pull down what they have set up, and *vice versa*, which is of an entirely other order. There should in fact be this balance of building up and again breaking down of forms. Nowadays, however, the destructive tendencies arising in the nervous system are predominant owing to the degree to which modern children are brought to live in this system; in modelling, however, they can find an excellent outlet for their creative energies.

Even young children become exceedingly skilful with their hands, and children in Michael Hall have made many models which show the minutest details. Their fingers become exceedingly nimble, and when we remember the connection of the will-life with later powers of thinking, we can really say that these nimble fingers will later produce nimble minds.

The materials used for little children are plasticine and glitter wax.* The wax is in every way preferable to the plasticine, but the latter is cheaper, and also has its uses. The wax requires a certain amount of work by the hands to soften it before it can take on a desired form, which can also be regarded as an advantage. The age in which instinctive modelling powers especially express themselves is that of the younger children, from the age of three to about eight.

After the change of teeth the children come more and more into an age where painting is the most natural activity,

* Can be obtained in delightful radiant colours from the Waldorf Toy Co.

because again it is in accordance with the life of feeling and of thinking in picture forms which predominates between seven and fourteen.

At the age of about eleven the children for the first time approach the subject that deals with forms through thought—that is Geometry—and it is exceedingly valuable if at this stage they can experience the geometrical forms with which they are dealing not only in two but also in three dimensions. But now they are old enough to use clay, and solids, such as the sphere, pyramid, cube, cylinder, etc., are made with the greatest possible accuracy—a work which requires a much greater degree of consciousness and control than that described before.

After these difficulties have been overcome, the children can pass on to make animals, in which they are very much interested at this point of their development. Much can be done to help the first period of lessons on animals by going into the whole gesture and will-life of the animal in question—bull, lion, etc.—in making models of them.

At the age of twelve or thirteen all plastic work is done in wood, a medium more suitable for children at the approach of puberty, for reasons expressed in an earlier article on wood-work in this magazine.*

When the children have overcome the first shocks of the puberty change and are beginning to settle down in the new outlook on life that puberty brings about, it is time to give them the opportunity of working right into an earthly substance such as clay. The puberty experience is one of death (the child dies, the adolescent is born), and it is one of the most powerful agents in overcoming these death-forces to allow and help the children to turn clay that is dead into clay that is enlivened by the forming power of the human spirit.

The children may choose whatever subject they like. It happens, however, very frequently that without the children consciously wanting it animal forms appear—often snake- or dragon-like, but not necessarily representing shapes of a definite animal. Sometimes such a shape may be a human being with long snake-like arms. These forms are mostly ugly, and they are even meant to be ugly as an instinctive

* Vol. 2, No. 2.

expression of the disturbance which has entered the child's will; it is therefore of little use to the child to encourage him to make beautiful what in his inner being is ugly. What can be done, however, is to try to discover the direction towards which the child is working, and to help him to reach that point and even to go beyond it; in other words, to carry the idea that is striving to come to expression to its artistic limit. Each part must then be an expression of the whole—there must be no contradictions.

It is obvious to the teacher that the child working in this way is working something off—frequently the vigour and speed with which such a form is carried through gives proof of an inner urge of necessity to bring something to expression—and a subsequent relief on the part of the child can be a very gratifying experience. In such cases help by the teacher is by no means necessary; it is when a mood of dullness, inertia, and “I can't go on” spirit comes over the child that help is most urgently required. To show possibilities of development in the direction of the child's own wish is the best form of encouragement. Spasms of listlessness and antipathy are very frequent at this age, and it is damaging to the child to throw his cautiously emerging “self” back into the hidden depths of its origin by outspoken or inward antipathy. It is not easy to entice the tender plant of the Ego out of its hidden shrine when once that mistake has been made. At this stage of a child's development the self is clouded by experiences of body and soul which tend to darken it; it must not, therefore, be received immediately it emerges by the coarse hand which wants to compel it into this or that channel. The teacher requires a fund of sympathetic receptivity for all that comes forth, both good and bad. Little by little the confidence that a child at puberty always loses is regained—and the activity of modelling is an indispensable help in this direction.

It may take a long time for the real self of the child to emerge, and it may happen that again and again forms such as those described earlier are produced—but in successive weeks and years (the children have a period of modelling about once a year, eight hours a week for four weeks) a development

can be observed. More and more a human element enters in, there is a kind of tension between the human and the animal—it may even be a battle in which it is not always the human being who looks like being victorious. The human forms are sometimes quite caught up in the animal forms and merge into them—then there is a separate and finally a clear distinction between animal and human, or the latter is the victor. One or two examples may serve to illustrate this.

A child of fifteen produced a form which was partly human but had very ugly features, the arms and legs being unnaturally long and snake-like, and ending in claw-shaped hands. This model was done with very little help or suggestion on the part of the teacher. After this a still more pronounced example of this kind was produced—then followed a figure of a peasant woman tending her sick child. None of the subjects were given, or even suggested—but arose out of the modelling activity of the child. In the modelling period a year later the same child again began with uncouth forms, amongst them a large, very ugly head—the animal coming to expression in a human face—but there was a clear advance in strength, and a human element had at any rate entered in. Finally a year later, again after various attempts, a dragon was represented with a human figure standing nobly erect by its side and resting his shield on the dragon's back.

Another example can be given of a more intellectual child who repeatedly made very ugly heads with voracious mouths and large misshapen noses. The child was helped by the teacher to carry these tendencies to their extremes with almost frightening results of ugliness. After this an entirely different type of head was born, quite contrary to those previously made.

Again another child made a head of which she said it was to be the most ugly and evil one that could be imagined—the result was very successful in so far as it expressed that type. After this came the head of a beautiful person, and again it was successful. In this case the child quite consciously expressed the desire to do the one kind of head and then the other.

No models to copy from are used in these lessons—the

modelling is, on the contrary, an entirely inner activity of soul—and only in this way can become the freeing and healing agent which it should be.

If you have this healing power of creative art in mind you can help the children best by giving them inner freedom and protecting them from their own intellectualism, which is like a layer hiding the self which is really wanting to come to expression. There is a clear distinction between forms that are inwardly experienced and those outwardly copied from visible nature. The child should live above all in this activity of producing the former—the adult should strive for the combination of both. The illustrations reproduced will serve to amplify what has been said in this brief article—they do not depict any of the actual examples given.

A. W. KAUFMANN.

Lohengrin

PERFORMED BY CLASS VII WHEN THE SCHOOL
WAS RENAMED.

(The Scene remains the same throughout the play: a meadow, at the margin of which a stream flows.)

SCENE I.

(Enter the HOLY ROMAN EMPEROR HENRY, known as the FOWLER, the LADY ELSA OF CLEVES, DUKE FREDERICK, and the PEOPLE OF CLEVES.)

EMPEROR:

Here as your Emperor do we take our stand,
And, under God the Father, whose great hand
Did make us ruler, we with equal heart
Now hold the scales of justice. 'Tis our part
To hear each man aggrieved relate his cause,
That, in the knowledge of our ancient laws,
We may decide how wrongs should righted be.
Now, 'tis with heavy heart that we do see
How some great sadness shrouds all men in gloom,
As if sweet life itself lay in the tomb.

[16]

Where'er we turn, we mark the leaden eye
That speaks of sorrow ever passing by.
(To ELSA.) Say out to us, O princess, whence this dole,
Which drives the light of day from out the soul
Of all your people. Tell us now, we pray.

ELSA:

For very grief, I can no answer say.

PEOPLE:

Hear us, O Emperor! evil is our stead.
We dwell here not as living men, but dead.
Some demon curse o'er all our land is cast,
And brings upon us sorrows thick and fast.
Our ancient laws, that erstwhile ruled our blood,
As doth the moon the ocean's turbulent flood,
Have now no hold upon our loyalty,
And all forget they grow upon one tree.
Each one, his own gain seeking, draws apart,
And breaks the threads that bind men heart to heart.
Thus does it happen that we are beset
By every passion that the soul can fret
And foul. Greed, falsehood, hate, like monsters stall
Within each house and home. Nor is this all:
A loathsome sickness, which no medicines stay,
Attacks our bodies, withering them away.
Evil indeed. O Emperor, is our stead.
We go now, not like living men, but dead.

EMPEROR:

Evil indeed, if these true tidings be.
Ne'er have we heard of such vast misery.
To help and heal it are we truly fain,
But first the ground, in which such piteous pain
Is rooted, must we know. What is the seed
Which, finding soil, doth grow such poisonous weed,
And brings mortality to all who eat?
If this you know, O princess, we entreat
That all things you reveal to us straightway.
(ELSA is silent.) She cannot speak, but turns in grief away.

DUKE FREDERICK:

She will not speak, O Emperor, though for aye
You pleaded sore she should her knowledge say.

[17]

She will not speak a word, though well she knows
How this huge, mountainous misery arose.

EMPEROR:

Your words are harsh, Duke Frederick, to our ear,
And hide a charge, which like a sharpened spear
Pricks through the honour of your princess high.
When in such times as these she must rely
Upon her liegemen, we do find it strange
That you with such rough mouth against her range.

FREDERICK:

Pardon, O Emperor, if too hot I seem!
But I know that, which like an evil dream
Haunts every hour. I see this land laid waste,
And know where skulks and schemes the soul debased,
Whose deeds have won this evil for our share.
Like to a fox, which hides within its lair
And plans still further harm, I see this one
Without a care for whom she has undone.
Trust not this mist of grief, it does but hide
The jagged rocks, that in her soul abide.

EMPEROR:

Now by our two-fold crown, we hereby swear
These words which roll so ominous through the air,
That every heart must quake, shall not pass by
Without revealing whether truth or lie
Lives in them. Now, your grace, we charge you straight,
As you a knight are and a man, relate
What solemn accusation you do bring
Against this lady! Hint not at this thing
In terms ambiguous! Muffle not the truth,
But speak what you do know in very sooth!

FREDERICK:

I will be brief, and speak what I do know.
The Lady Elsa's lily hands do show
Before my eyes as red as blood. And well
They might, for they have murder fell
Committed.

EMPEROR:

God's own glorious Son defend
Our souls from evil at the bitter end!

[18]

Upon your life, speak on, and speak it plain!
Whom do you say she has in murder slain?

DUKE:

In murder foul she has her brother killed.
Such is the spring from which our land is filled
With this salt sea of woe.

EMPEROR:

May angels bright
Inspire our hearts, that we may live aright!
On with your heavy tale! When do you say
The lady Elsa did her brother slay?

DUKE:

Three months ago within the castle wood
I came across her, even as she stood
With treacherous dagger in her hand, above
Her brother's fallen corpse.

EMPEROR:

Know you must prove
That this your charge in face of heaven is true?

DUKE:

This do I know, and am prepared to do.
In face of heaven and with righteous sword,
I will by battle's ordeal prove my word.

EMPEROR:

Hear you, sweet lady, what the duke has said?
That he has seen your noble brother dead,
Beneath the stroke of your own hand.

ELSA:

My lord,
It is not so. Truth and his every word
Are strangers to each other. Where to find
My dearest brother now, I do not know,
Nor have these three months known. It may be so
That he is dead, that he is foully slain.
But 'tis not from my hand his blood's red stain
For justice cries. When last I did him see
He was alive as any springing tree.
May God it please that he is so to-day.

FREDERICK:

These are mere words, and make but little way

[19]

Where deeds must work. I will with main and might
Of my strong arm approve me in the right.

ELSA:

Were I a man, and had the brawn and strength
I lack, I would upon your body's length
Prove you a liar and a craven too.
But as a maid, this deed I cannot do.
I must rely upon the righteous arm
Of some heroic man, whose heart grows warm
When those in need cry out for instant aid.
Many already must in wrath have laid
Indignant hands upon their sheathèd swords,
When they did hear the venom-tinctured words
Of this base Duke. Demand you straight, my liege,
Who now will sally forth against the siege
Thus vilely laid against me!

EMPEROR:

Without delay!

My lords, you all have heard Duke Frederick lay
His solemn accusation 'gainst the name
Of this your lady. Him you heard proclaim
His readiness to prove his words by might
Of arms, as ancient custom yields, in sight
Of Heaven. Lady Elsa firm denies
In open terms his charge, and now relies
On those who know and love her for defence.
Who now is ready in her need intense
To draw his sword, himself must forthwith show,
When now our herald doth the summons blow.
(*To the HERALD.*) Herald, let far the brazen trumpet sound,
And in high-lifted voice proclaim around
Our royal will!

HERALD (*after blowing his trumpet*).

Give ear, ye lords and knights,
While now I speak! His Grace Duke Frederick fights
To prove the Lady Elsa fratricide.
His charge the lady Elsa clear denied,
And seeks a champion to approve her right.
Who then in Lady Elsa's cause will fight.

(*No one speaks.*)

FREDERICK:

'Tis clear as daylight where the people think
The truth doth stand. Mark well, how all do shrink
From fighting in defence of her weak word.

PEOPLE:

Alas! we know the might of Frederick's sword.
Ne'er yet in battle has he worsted been,
But always, at the combat's end, has seen
His enemy laid low. For very fear
His awful blade we dare not venture near.

ELSA:

O, give me audience! From this fear he draws
Vain confidence that e'en a perjured cause
He can maintain in face of Heaven. Oh, recall
How he who fights for truth need fear no fall!
Since angel-hosts on sun-lit wings will sweep
To help him in his need. His sword will leap
Through throngèd demons like a flame of light.

HERALD:

A second time my question I recite.
Who now in lady Elsa's cause will fight?

PEOPLE:

Alas! Alas! not one of us dare brave
The wrath of Frederick, e'en though 'twere to save
Our very souls. Not one of us could keep
His ground before him more than would a sheep.

FREDERICK (*to* ELSA):

Nought that you do or think, nought that you say,
Can save you from your final fate this day.

ELSA:

All goodness, beauty, truth have taken flight
From this poor world, and men have lost the light
Which shows the way of soul that they should tread.
O Knights-at-arms, O men, are you quite dead
At heart, that you in callous stupor lie,
While falsehood overthrows humanity?

HERALD:

I lift my voice for third and final time:
Who'll fight to prove the lady free from crime.

PEOPLE:

Woe is her portion, loss of land and life,
Since no one will endure the stress and strife,
Through which alone she might be spared the tears
Of falling in the spring-time of her years.

FREDERICK:

The day is won for me, and at an end
For her. She now must die, while I ascend
To take her place as ruler of this land.

EMPEROR:

Peace, peace, see where she doth stand!

ELSA:

O shining stars, that lull the earth asleep
With tender song, and steadfast watch do keep
While men a-bed lie dreaming, you do know
How yesternight a vision clear did show
Its form ethereal to me. It shone bright
Before my wondering eyes, a noble Knight,
From head to foot in gleaming armour clad.
He looked on me with radiant eyes, all glad
With joyful love. O star-crowned angels, send
This heavenly Knight, that he may me defend
And save from death, where earthly powers end.

PEOPLE:

What wondrous words are these, which but to hear
Stirs up the heart against the spell of fear?

FREDERICK:

Her crime has made her mad. Make no delay,
Great Emperor! At once your judgment say!

PEOPLE:

See, see, who comes so wondrous fair,
A Knight in armour steeled, his weapon bare
Within his hand! He holds himself upright
Within a silver boat, all sparkling bright
Like crescent moon. And, see, the moving boat
Is drawn on by a swan, that swift doth float
A-down the stream, alert with watchful eyes
In high-uplifted head, all white and wise.
Now it is here, and hastens on no more,
The while the Knight leaps out upon the shore.

LOHENGRIN (*to the swan*):

I give thee thanks, O snow-white swan, that thou
Didst lead me where my destiny doth now
Require me. O'er the wind-stirred sea of life
Return to heavenly realms, whilst here in strife,
Still mindful of thy Spirit-guidance true,
I do that which the stars would have me do.
(*To the EMPEROR.*) I come, O Emperor, at your trumpet's

breath

To offer battle to the powers of death
That in this man are sovereign. Fierce desire
For what he has not got, like to a fire
Roars in his members, driving him to seize
Whatever quarry will his rage appease.
Across the starry sky of thought its smoke
Rolls heavily and dark, and like a cloak
Obscures the light, bewitching it to lies.
Hear you, O Emperor, what I now devise
As answer to this man.

(*To FREDERICK.*) I do you accuse
Of falsehood foul. Most devilish lies you use
To win a princely power that's not your own
From this fair lady. Let it now be shown
In battle's ordeal, even as you say,
Which of us twain has spoken truth this day.

EMPEROR:

Sir Knight, your name we know not, but we see
Your gear and guise proclaim you knight to be.
What say you, Frederick, to this bold reply?

FREDERICK:

He has a villain's face, nor do I doubt
He seeks by some enchantment black to flout
The will of Heaven. Thus would he obtain
A rich reward, for covering up the stain
Of murder that doth Lady Elsa dim.
He is a wizard. I'll not fight with him.

EMPEROR:

We think you guess at what you do not know,
And call it truth. Sir Knight, can it be so
That you with magic means the victory seek?

LOHENGRIN:

'Tis but another lie this man doth speak.
I draw my draught of strength from that sweet spring
Which waits to sally forth, and rippling sing
In every human soul. No strength have I
But that on which all Christian men rely.

FREDERICK:

Come then to the field, and rue the day
You ever sought Duke Frederick to stay!

LOHENGRIN:

I come, my star-predestined task to do.

ELSA:

May Michael victorious be with you.

EMPEROR:

Forth to the field, and let God's will be done!
So for this suffering folk shall life be won.

(Exeunt.)

SCENE II

(All return, with the exception of DUKE FREDERICK.)

EMPEROR:

Thus has the doubtful turmoil of the fight
Come to its end, and in the dazzling light
Of your quick-flashing sword we could perceive
The Heavenly judgment, at whose hands receive
All men the fortune which their deeds require.
Frederick is dead, and may the cleansing fire
Of wisdom purge his soul. I now declare
You, Lady Elsa, innocent and fair.
In name of Him who gave all things their breath,
In name of Him who gives us life in death,
In name of Him who inward light does yield,
Go fearless and free through every field.

ELSA:

In these three holy names I take your word.
But lately did it seem that I had heard
The voices of the earth grow faint and low.
And all the deeds that I had longed to do
Seemed doomed ne'er to be born. The wonders bright

Of this fair world, which do the eyes delight,
And make them shine as jewels, 'gan to fade,
As I felt death's cold hand upon me laid.
O, starry powers of destiny! I give
You thanks, that I with this sweet earth may live
A longer span.

(To LOHENGRIN.) O Knight, known yet unknown,
I thank you too, that you my heart's sad moan
Did hear, and answered it straightway.

LOHENGRIN:

When in despair's dark pit a man doth pray
For heavenly light, it sure will shine, and bring
New spirit life within. My soul did sing
When it was laid on me to succour you.
From death's close cell. Within that hour I knew
Our hearts must dance to destiny's music deep
Together. Would your heaven-born will might leap
Into your thoughts, that you in love might know
How our two lives should as one river flow.

ELSA:

I have no doubt, all's clear within my mind.
My heart beats strong with joy, my limbs I find
As free as air. Full gladly my own life
I'll weave with yours, and be your loving wife.

LOHENGRIN:

Thus let it be, fair Elsa. I have come to you
At Heaven's bidding, heavenly tasks to do.
Seek not, therefore, my earthly tale to know,
For that would tell you nothing that could show
My inward heavenly man. Ask not from me
My earthly name, or parents, or degree,
Or land of birth. If these you burned to find,
Then you would cloud the windows of the mind
With fummy smoke, and we would lose all sight
Each of the other. O Elsa, keep you bright
Your love for me, that I may still abide
Within your heart, and never leave your side.

ELSA:

Dear husband, 'tis enough for me to know
What first the future of your life can show.

EMPEROR:

Henceforth may you and your whole people live
Within the light of Him who life doth give.

SCENE III

PEOPLE:

As in the summer o'er a happy land
A cloud appears, no bigger than a hand,
Which yet may grow into the thund'rous dark
Of storm, so do we see with dread the mark
Of troubles in our state, which threaten plain
To bring upon us evil times again.
Once Elsa's knight had felled that direful man,
Duke Frederick, then our countless woes began
Straightway to lighten. Changed our fortunes old,
As changes winter gloom and biting cold
To Spring's fair weather. Then our souls with mirth
Were filled, that we again upon the earth
Could live like brothers, with our hearts close bound.
But now once more we feel the solid ground
Of friendship 'gin to quake. And hearken why!
Fair Elsa's heart is twisted all awry.
She thirsts and hungers, yea, full fierce doth burn
Her husband's earthly name from him to learn.
Till yet this inward storm she could command.
But now it must burst forth in hot demand.

(Enter ELSA.)

ELSA:

I cannot rest, I cannot find respite
From that which like a rat doth gnaw and bite
Below my heart. Must I for ever waive
The right to have the thing for which I crave?
Not one more sun shall set below the sea,
Before I know what he keeps close from me.

(Enter LOHENGRIN.)

LOHENGRIN:

You look not well, sweet Elsa. Let me find
Some healing herb, which will with influence kind
Give you some ease.

ELSA:

No ease is there for me
This day, nor for my live-long life can be,
Unless I win what I most yearn to have,
And what you hide so well within the cave
Of your own mind.

LOHENGRIN:

Nothing have I concealed,
But that, which if to you it were revealed
Would hide me from your eyes. Oh! do not seek
To know what would on you high havoc wreak.

ELSA:

Come life, come death, I care not what may fall.
But give me that for which my soul doth call.
What is your name? Your parents, who are they?
The place from which you came, reveal straightway!

LOHENGRIN:

Alas! the mist has fallen, which in vain
I hoped would never come betwixt us twain.
Now must I give you what you ask from me,
Though dust and ashes in your mouth 'twill be,
Since we a bitter parting must endure.
Lohengrin is my name, Conduiramur
And Parcival my parents. I did sail
From Mont Salvat, the Castle of the Grail,
Where those men dwell who care for human good,
And ease their hunger with a holy food.
Now that you know these things, I can remain
With you no more, but must go back again.
Already down the stream there floats the swan
To bear me back. Farewell! I must be gone.

ELSA:

What have I done? Ah me, the bitter pain!
Oh! do not go, but still with me remain!

LOHENGRIN:

It cannot be. Your destiny you must meet
With open heart and hands, both sour and sweet.
When I am gone, enkindle in the mind
The lamp of memory bright, and you will find
That my true being will to you show clear.

As for your brother, cast away all fear!
 He'll soon return, in love with you to dwell.
 And now, till we in spirit meet, farewell!

(Exit LOHENGRIN.)

PEOPLE:

So Lohengrin is gone, the spirit-knight,
 Beyond the scope of mortal, earthly sight.
 Yet comfort take, O Elsa! Do not stand
 All cold with grief, but to that heavenly land
 From which we all are sprung, revert your eyes,
 And find again the pathway to the skies.
 So will the light, which dies within man's thought,
 Rise up from death, and to fresh life be brought.

J. DARRELL.

First Lessons in Algebra

WHEN our children are about twelve years old a number of new subjects appear in the School curriculum for the first time: Physics, Chemistry, Geometry, Algebra. These are essentially subjects which appeal to the awakening intellect of the growing child, and it is at about this age of twelve years that the life of thought begins to pass from a thinking penetrated by feeling to a thinking in which the element of logic becomes ever stronger as the children grow towards adolescence.

In the Mathematics Curriculum given by Rudolf Steiner for his schools we find the following for the sixth class (ages 11 + to 12 +): Calculations of Percentages and Simple Interest are begun . . . and then Algebra is allowed to grow out of Interest sums. For the seventh class the following indications are given: Lessons on powers (indices), roots, negative numbers, and equations in relation to practical life.

Let us consider in detail how the beginnings of Algebra can grow out of sums in Simple Interest by taking an example Find the Simple Interest on £1,000 for 3 years at 4 per cent per annum.

$$\begin{aligned}\text{Interest for 1 year} &= \frac{4}{100} \text{ of } £1,000 \\ &= £40 \\ \therefore \text{ „ „ 3 years} &= £40 \times 3 \\ &= £120 \text{ Ans.}\end{aligned}$$

[28]

The children find that whatever the numbers may be, the answer to the problem is always obtained in exactly the same way, i.e. the same mathematical processes are used in every case. What are these processes? They are summed up in the following statement which the children can find out when they have been given the names of the different parts of the problem:—

$$\text{Simple Interest} = \frac{\text{Principal} \times \text{Rate \%} \times \text{Time in years}}{100}$$

This may now be written in a simplified form, using only the initial letters of the words:—

$$I = \frac{P \times R \times T}{100}$$

Here, then, we have an algebraical expression which is applicable to all problems in Simple Interest.

The next step is to point out to the children that in Algebra there is no need to use the multiplication sign; if letters stand next to one another without any sign between, this means that they are multiplied. Thus we have:—

$$I = \frac{PRT}{100}$$

One may of course introduce the subject from examples other than Simple Interest. Take a simple division sum: Six divided into fifty-seven goes nine times and three over.

$$6) 57 (9 + 3 \text{ over}$$

This process can now be expressed in general terms:—

$$\text{Divisor) Dividend (Quotient + Remainder}$$

The substitution of the initial letter for the word here gives rise to the difficulty that there will be two D's which stand for different things; thus another letter must be chosen to stand for either the Divisor or the Dividend. Suppose we choose the letter x to stand for the Dividend. Then we have (using small letters, which are more usual in Algebra):—

$$d) x (q + r$$

Now supposing we are given the divisor, the quotient, and the remainder, and want to find the dividend. Then the children clearly see that they must multiply the divisor by the quotient, and add the remainder:—

$$\text{i.e. } x = dq + r$$

[29]

Or, again, if we want to find the divisor, being given the other three parts of the division sum, we should subtract the remainder from the dividend and divide by the quotient:—

$$\text{i.e. } d = \frac{x - r}{q}$$

To find the quotient we subtract the remainder from the dividend and divide by the divisor:—

$$\text{i.e. } q = \frac{x - r}{d}$$

Finally, if we want to find the remainder we can multiply the divisor by the quotient and subtract this product from the dividend:—

$$\text{i.e. } r = x - dq$$

All these things the children can discover for themselves by many examples with numbers, and they will then see that the *processes* they use are expressed by one of the four algebraical expressions above. One should now make clear to the children that these four expressions are not really different from one another, but they express the same truth in four different ways, i.e. they are four forms of one and the same EQUATION.

The word equation implies balance. The picture of the process of weighing will help children of this age to understand the processes involved in solving simple equations. Suppose we have in one pan of a balance four separate pounds of sugar and in the other pan four 1-lb. weights, then there is an equality of weights giving perfect balance. If now we add another 3 lbs. of sugar the equation is destroyed, and to restore balance we must add a 3-lb. weight to the other pan; or, if we take off 1 lb. of sugar we must also take away a 1-lb. weight for balance to be preserved. Again, we may treble the weight of sugar, provided we have three times the number of 1-lb. weights; and finally, if we divide the weight of sugar, say, by 4, leaving only 1 lb. on the pan, we must at the same time divide the number of 1-lb. weights by 4 (thus leaving only one 1-lb. weight on the pan) in order that we may keep the "equation."

This is a pictorial way of expressing the four well-known

axioms which are the mathematical "tools" we use in solving equations:—

- (1) If equals are added to equals the sums are equal.
- (2) If equals are subtracted from equals the differences are equal.
- (3) If equals are multiplied by equals the products are equal.
- (4) If equals are divided by equals the quotients are equal.

If the teacher treats these things in a pictorial way, the children understand, for example, that when they apply the rule of taking a quantity from one side of an equation to the other and changing its sign (— changes to +, or + to —), this is no mere arbitrary rule, but involves a necessary process in which either axiom 1 or 2 is employed. Let us illustrate this:—

Solve the equation $x - 3 = 7$.

Axiom 1. Add 3 to both sides.

$$\begin{aligned} x - 3 + 3 &= 7 + 3 \\ x &= 7 + 3 \\ x &= 10. \text{ Ans.} \end{aligned}$$

Solve the equation $x + 6 = 9$.

Axiom 2. Subtract 6 from both sides.

$$\begin{aligned} x + 6 - 6 &= 9 - 6 \\ x &= 9 - 6 \\ x &= 3. \text{ Ans.} \end{aligned}$$

The solving of an equation really means that we calculate backwards. As an example take the following equation:—

$$3\left(\frac{x}{7} + 4\right) = 27$$

This is a statement which means that a number, x , which we want to find, is first divided by 7, and then 4 is added; the result is then multiplied by 3, and we get the answer 27. To solve the equation we take exactly the reverse course. If when we multiply by 3 we get 27, then before this multiplication we must have had the number 9.

Thus
$$\frac{x}{7} + 4 = 9$$

The number 9 comes about after adding 4. Therefore before this addition we must have had the number 5:—

$$\text{i.e. } \frac{x}{7} = 5$$

Again, the number 5 is the result of dividing the number we

want to find, x , by 7; i.e. this number must be 7 times as great as 5.

Thus

$$x = 35$$

The processes involved here are those of the axioms:—

$$3\left(\frac{x}{7} + 4\right) = 27$$

$$\frac{x}{7} + 4 = 9 \quad (\text{Axiom 4})$$

$$\frac{x}{7} = 9 - 4 \quad (\text{Axiom 2})$$

$$\frac{x}{7} = 5$$

$$x = 35 \quad (\text{Axiom 3})$$

Every step taken in the Algebra lessons should give the children a greater understanding for the processes they use in Arithmetic. They should realize that in Algebra these processes are expressed by a kind of "shorthand," and that this shorthand and the symbols which it uses have quite an exact and definite meaning. One of the chief difficulties which children have with the subject is often just on this point—that they do not understand this shorthand language, and therefore cannot translate it into the language of the four rules of Arithmetic with which they are quite familiar. The use of "brackets" is an example of symbols which must be clearly understood. What is the difference in meaning between $3 \times 7 - 4$ and $3(7 - 4)$? "Translating" the first expression we have:—

Multiply 3 by 7 and then subtract 4. The second expression means: Subtract 4 from 7 and then multiply by 3.

Thus

$$3 \times 7 - 4 = 21 - 4 = 17$$

and

$$3(7 - 4) = 3 \times 3 = 9.$$

With reference to mathematical processes we must realize that there is a definite series of values of which the highest member is the Logarithm, and the lowest is the Sum:—

Logarithm
Root
Power
Quotient
Product
Difference
Sum

If we have an expression without brackets, then, as it were, the "higher" process overcomes the "lower"; thus in $3 \times 7 - 4$ multiplication overcomes subtraction, i.e. we do the multiplication first and the subtraction second. If, however, the expression has brackets, then the lower process overcomes the higher; in $3(7 - 4)$, subtraction overcomes multiplication, i.e. we do the subtraction first and the multiplication second. This may be put before the children in a pictorial way: brackets are like a protecting castle wall, whereby the knights within the castle are linked together because it is their home; and just because they are so linked together they become stronger, and can overcome attacks from outside. The "enemy" may even be a very powerful one, and yet the knights inside the castle wall overcome him:

$(a + b)^2$ — Add a to b and then square the sum
 $a + b^2$ — Square b and then add a .

This law concerning brackets holds true in all cases.

In this last example we have introduced another important stage of algebraical "shorthand," i.e. the use of the index in indicating a power. How very easy it is for children beginning Algebra to fall into the error of thinking that 3^2 is the same as 3×2 ! The teacher must make this "chapter" of the subject very clear to his children so that they come to realize that 3^2 is only a "shorthand" way of writing down 3×3 . One can write down a series of powers (a series which the children will later come to know as a Geometrical Progression), and underneath it the corresponding series in the "language" of Arithmetic:—

Algebra: x^1, x^2, x^3, x^4, x^5 , etc.

Arithmetic: $x, x \times x, x \times x \times x, x \times x \times x \times x, x \times x \times x \times x \times x$, etc.

It is clear that each term in this series is obtained by *adding* 1 to the index of the previous term (Algebra line), or by *multiplying* the preceding term by x (Arithmetic line). We may now write it down the other way round:—

Algebra: etc. x^5, x^4, x^3, x^2, x^1

Arithmetic: etc. $x \times x \times x \times x \times x, x \times x \times x \times x, x \times x \times x, x \times x, x$

Here each term is obtained by *subtracting* 1 from the index of the previous term (Algebra line), or by *dividing* the preceding term by x (Arithmetic line). This and other examples

will make it clear that for multiplication indices are added, while for division they are subtracted. One can now develop this series further by continuing to divide by x , i.e. subtracting 1 from the indices:—

Algebra: etc. x^2 , x^1 , x^0 , x^{-1} , x^{-2} , etc.

Arithmetic: etc. $x \times x$, x , 1, $\frac{1}{x}$, $\frac{1}{x^2}$, etc.

This will be of great interest to the children even at the beginnings of Algebra. They will see how by consistently carrying out a simple process they arrive, for example, at the following strange result: $x^0 = 1$. x^0 cannot be translated into Arithmetical "longhand" to give any sensible meaning, and yet x^0 must equal unity because of the consistency of correct mathematical processes. The children will not further pursue these ideas at this early stage, but will pick them up again later when they study the theory of indices. Incidentally, it is always interesting and valuable before showing that $x^0 = 1$ to ask the children what *they* think it is. (They will, of course, realize that if x^3 , x^2 , etc., have definite meanings, so x^0 must have an interpretation.) The usual answers one will get are that x^0 is 0, or that x^0 is x . One can show them that these cannot be: for $x \times 0 = 0$, and 0 used as an index cannot lead to the same result as 0 used as a multiplier; again $x^1 = x$, so that if x^0 also was equal to x this would mean that 0 was equal to 1, which of course is ridiculous. It may be thought that bringing in such an abstraction as x^0 at such an early stage of the work is too difficult for the children, and yet it has been shown how it arises quite naturally out of the elementary work, and to touch upon such things awakens the children's wonder at and interest for simple mathematical processes carried to their logical conclusion.

Another of the difficulties to be overcome in the beginnings of Algebra is the treatment of the minus sign. A minus number standing alone is an abstraction. There is one example in ordinary life where we speak of a minus quantity, and that is when we say that Mr. Robinson has a debt of £5. Translated into the terms of Algebra we could say: Mr. Robinson has minus £5, i.e. he has $-£5$. In bringing an understanding of the minus quantity to children one can treat it, compared with the plus quantity, as a change of direction. (This is quite in

accordance with the meaning of + and - in Cartesian geometry, which the children will learn about later.) One may perhaps give the following problem: $6 - 4 + 3 - 7 - 2 + 9$. Now let the children imagine a ladder going from the stable to the hay-loft, and another ladder from the hay-loft to a storeroom above; then let one of the children imagine himself in the hay-loft, and that he is going to play a game of running up and down the two ladders according to the following directions:—

Up 6 rungs, down 4, up 3, down 7, down 2, and up 9. Now ask him where he is, and he will easily be able to reply: On the 5th rung *above* the hay-loft. Now suppose we call "up" the plus direction and "down" the minus direction, then we see that every time we change from plus to minus or *vice versa*, we change our direction. Thus,

$$6 - 4 + 3 - 7 - 2 + 9 = 5$$

The children will also see that they can deal with this problem in another way: they can add together the plus quantities $6 + 3 + 9 = 18$ and add together the minus quantities $4 + 7 + 2 = 13$, and then subtract the minus quantities from the plus quantities, $18 - 13 = 5$.

The teacher will next have to consider how to present multiplication by minus quantities. Why does $-3 \times (-2) = +6$? Here much can again be done by bringing the children to realize the perfection of form in mathematical processes. To begin with, they will readily understand the following:—

Even number + Even number = Even number
 Odd number + Even number = Odd number
 Even number + Odd number = Odd number
 Odd number + Odd number = Even number

This table is clearly complete and balanced, and each of the four statements is quite true.

Now, as it were, on a higher level of mathematical processes we have as follows:—

Positive number $\times$ Positive number = Positive number
 Negative number $\times$ Positive number = Negative number
 Positive number $\times$ Negative number = Negative number
 Negative number $\times$ Negative number = Positive number

There is a close analogy between these two sets of statements.

On the left-hand side there is every possibility of dealing with plus and minus quantities by multiplication—there is perfect balance. Therefore the answers on the right-hand side must also give harmony and balance. Such ideas as this lead the children to realize that two negative quantities multiplied together *must* give rise to a positive result. If this were not so the perfection of form of the table would be impaired; it would then give us the same impression as would a badly composed painting in which, say, the whole subject was painted of the left-hand side of the canvas, and there was nothing on the right to balance it.

In teaching long-division in Algebra we can again bring the children to a realization of this perfection of form in mathematics in such a “picture” as the following:—

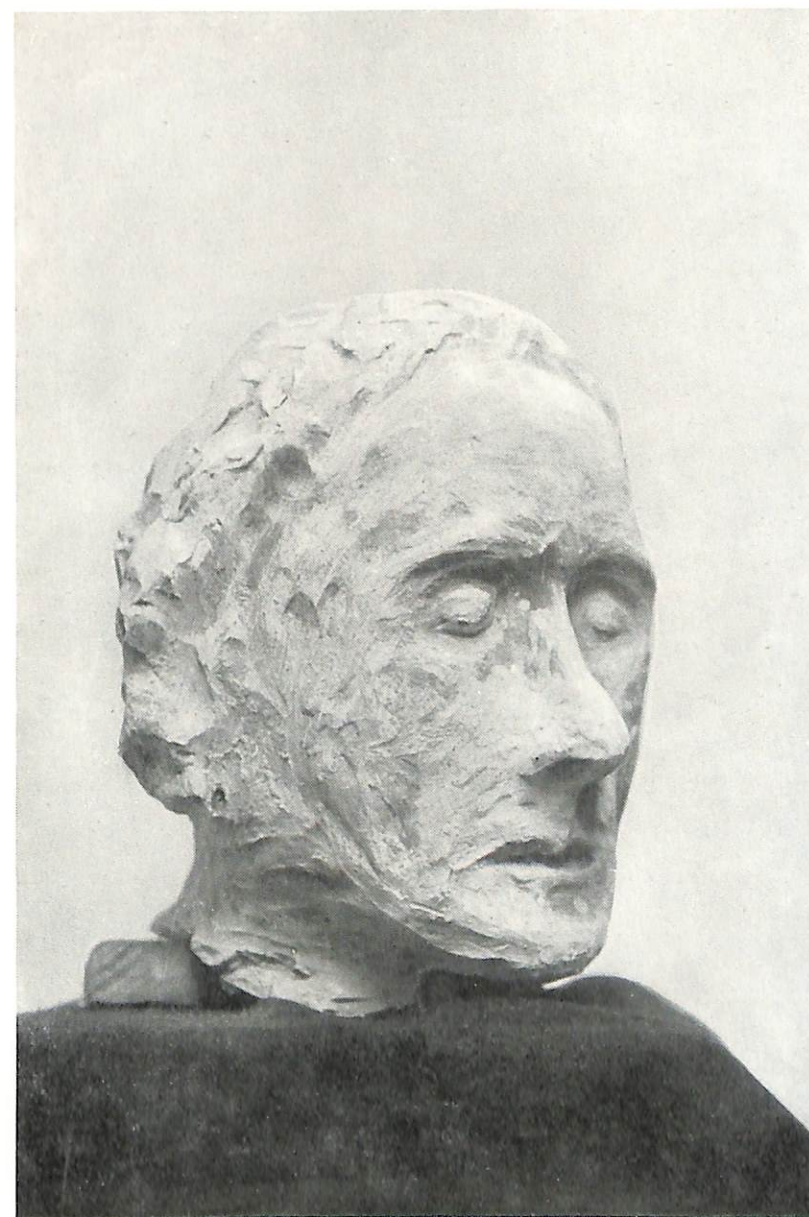
$$\begin{array}{r} \frac{x+y}{x+y} = 1 \\ \frac{x^2+y^2}{x+y} = \text{—} \\ \frac{x^3+y^3}{x+y} = x^2 - xy + y^2 \\ \frac{x^4+y^4}{x+y} = \text{—} \\ \text{etc.} \quad \text{etc.} \end{array}$$

$$\begin{array}{r} \frac{x-y}{x+y} = \text{—} \\ \frac{x^2-y^2}{x+y} = x-y \\ \frac{x^3-y^3}{x+y} = \text{—} \\ \frac{x^4-y^4}{x+y} = x^3 - x^2y + xy^2 - y^3 \\ \text{etc.} \quad \text{etc.} \end{array}$$

$$\begin{array}{r} \frac{x+y}{x-y} = \text{—} \\ \frac{x^2+y^2}{x-y} = \text{—} \\ \frac{x^3+y^3}{x-y} = \text{—} \\ \frac{x^4+y^4}{x-y} = \text{—} \\ \text{etc.} \quad \text{etc.} \end{array}$$

$$\begin{array}{r} \frac{x-y}{x-y} = 1 \\ \frac{x^2-y^2}{x-y} = x+y \\ \frac{x^3-y^3}{x-y} = x^2 + xy + y^2 \\ \frac{x^4-y^4}{x-y} = x^3 + x^2y - xy^2 + y^3 \\ \text{etc.} \quad \text{etc.} \end{array}$$

It is really imperative for a teacher to take the greatest care in preparing these first lessons in Algebra so that the children become conscious of the various processes in the right way. The child should experience the perfection of form inherent in mathematics. This will be akin to a musical experience in which he can feel a deep satisfaction. A. R. SHEEN.



HEAD OF A MAN
By a child of sixteen

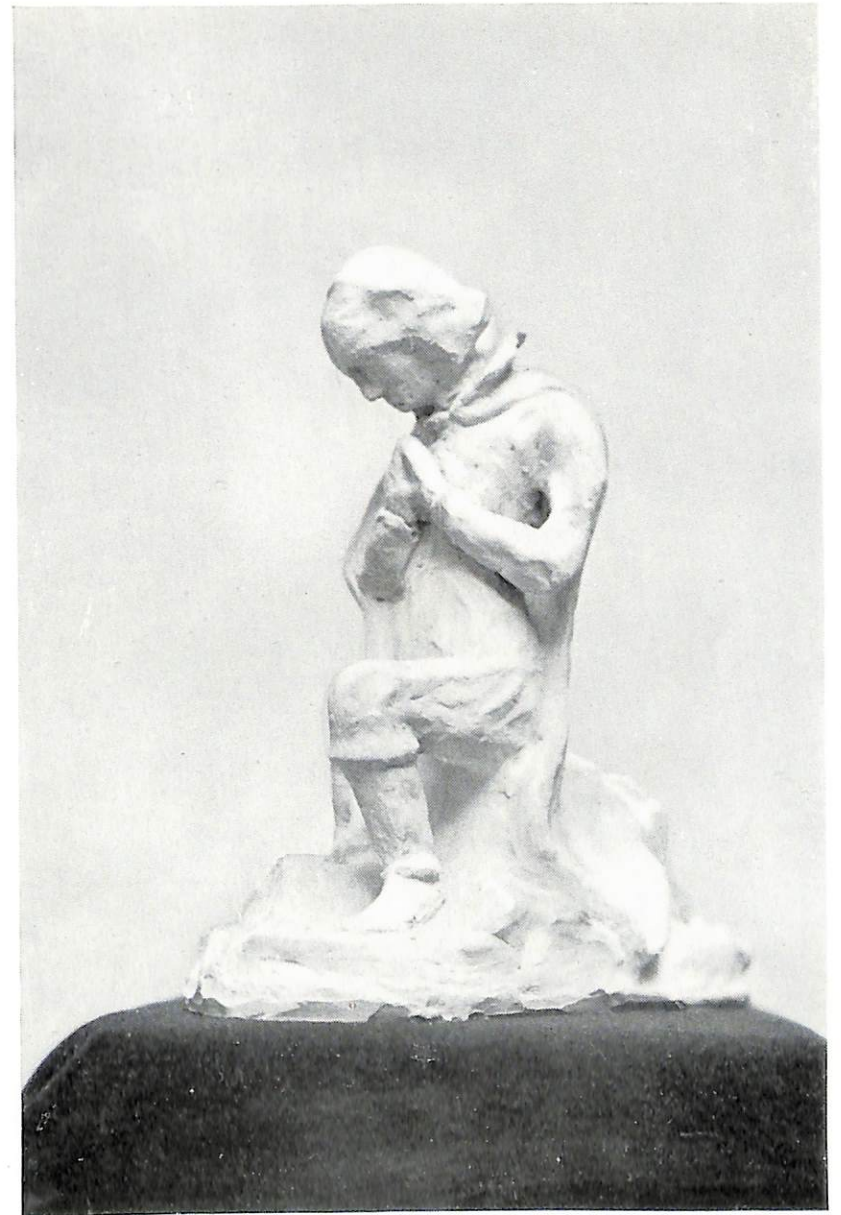


FIGURE OF A KNIGHT KNEELING
By a child of sixteen



MAN WRESTLING WITH ANIMAL
By a child of fifteen

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