

The Role of Dynamic Toys in Child's Development

E. A. Abdulaeva*,

*Educational Psychologist of Highest Category,
Nominee of "Moscow Grants", Methodist,
Moscow City Center of Psychological and
Pedagogical Examination of Play and Toys,
Moscow State University of Psychology and
Education*

E. O. Smirnova**,

*Doctor of Psychology, Professor, Head of the
Moscow City Center of Psychological and
Pedagogical Examination of Play and Toys,
Moscow State University of Psychology and
Education*

The article discusses a special kind of toys that reflect different types of motion, and therefore are called dynamic. On the one hand, such toys enable a child to feel own motion and its results, but on the other – represent the most important physical laws of the surrounding objective world. The author's (E. A. Abdulaeva) typology of dynamic toys is presented. It is differentiated on three grounds: the image, the motion pattern and the complexity of motion management. The detailed classification of dynamic toys is outlined, their age-reference and their value for development at different stages of ontogeny are presented in detail. Particular attention is paid to the role of toys in the formation of spatial "Self image", in development and mutual integration of "external Self" and "internal Self", external and internal perception. The possible use of dynamic toys in rehabilitation and correctional work is described.

Keywords: dynamic toys, moving toys, children's experimentation, types of dynamic toys, the level of motion complexity, internal and external perception, sense of self-motion, correction and developing work.

*elena-abdulaeva@mail.ru

**smirneo@mail.ru

Peculiar Features of Dynamic Toys

In different cultures of the world one may come across a wide variety of "moving" toys, which reflect different *characteristic* ways of movement, such as climbing, tumbling, rolling, turning the living beings and objects. The nature of toys' functions in different countries may be similar, while the characters may differ (e.g. the climbing bear in Russia and the climbing tiger in India). Considering the fact that the class of toys in question reflects the laws of dynamics, we may as well call them **dynamic** toys. The majority of such toys are presented by traditional wooden toys which are getting a new life. Some Russian moving (dynamic) toys (mostly, toys from the village of Bogorodskoye) are widely known abroad. These are the figures of a blacksmith, a hen, etc. Nowadays new dynamic toys are being elaborated on the basis of traditional folk toys (such as a clown with a bar, a diving whale, a skittle-ground, a juggler, etc).

The key characteristic of such toys is its direct reaction on the action and movement of that person who plays with them. Dynamic toys, on the one hand, give the child an opportunity to feel his/her own motions and their results, and, on the other hand, reflect the most important physical rules of the environment. While playing with such toys children are able to observe and perceive different concentrated types of movement. Children would also have an opportunity to observe not only quite evident features, but also those forces which are usually quite invisible e.g. inertia, friction, gravity, gliding. More than that, all those phenomena have everything to do with gravitation, for in every action a child does not only really feel its forces but also has to overcome them. Naturally, the children don't see gravitation, but they experience its influence with their own senses.

Dynamic toys should be distinguished, on the one hand, from **mechanical or electronic ones**, and, on the other hand, from **playground devices and equipment necessary for the development of movements**.

Since the second half of the XIX century the windup toys have come to existence (e.g. the dancers, the sawyers, the acrobats, the merry-go-rounds, etc.). The toys' movements have stopped

being dependent of the actions of those who play with it. The startup has become much easier, and the mechanisms work has become much more sophisticated and independent. Moreover, the machinery of the toy has now become **concealed** and, therefore, incomprehensible. It has become a real revolution in the toy-making business caused by an evident technological progress, on the one hand, and the breakaway from the laws of playing which has lead to distancing the toy from the player, on the other. The movements of toys have become more accurate and more dexterous, but the child now can harder influence or change them, and, which is the most important, "animate" the toy by the power of his/her imagination.

Nowadays the so-called "interactive" toys, which appear to be nothing more than robots, are the ones which are most popular among the parents: e.g., dogs would wag their tails as soon as you take them, being put down on the floor they would start crying "bow-vow", rolling, nodding, etc. The movements of these toys do not depend on the child's will, they are not operated by the child at all. Therefore, electrical, electronic or windup toys can hardly be called dynamic. They have the set up programs and their movements do not depend upon the child.

So, a common feature, typical of all dynamic toys (as opposed to mechanized and robotized ones), consists in the fact that a child him/herself puts them in motion (spins a humming-top, starts the balls' rolling, or rocks a tilting doll). At the same time, the nature and peculiarities of a concrete motion depend on a child his/her **own** and, as a rule, vary with respect to the child's skills, and playing imagination.

Dynamic toys and motions' developing equipment, however similar they may seem, both possessing a sensor component, are still to be kept clearly apart from each other. The difference lies in how they **motivate the child's activities**. Pedals for walking, disks for spinning, equipment for balancing, climbing, tumbling, etc. are made for developing and improving human's motions. In this case, the motive for action is aimed at the development of a child's personal dexterity, strength, coordination of movements, etc. A child "switches on" him/herself using playing "simulators" like these. In case of dynamic toys, con-

versely, the motive is aimed at putting a **toy** in motion, child's own movements, its proportionality and dexterity becoming just the side effects of a game. The game is actually played not for the sake of developing one's personal dexterity but rather for the sake of enlivening a toy, evoking its "proper" movements.

Aiming at a toy is more common and well-understood than aiming at a person him- or herself in the child's early and early preschool ages. The thoughtful control of one's motion, the self-improvement, as well as competitiveness are typical of the later stage of a person's development, that of the school age. It is this very age which sets up a "top-limit" for playing dynamic toys for then the items which are not at all toys come to the foreground. As for the early and preschool stages, dynamic toys really play a developmental role, the reliability and identity of motions being an imperative for the younger children. In the school age, it is no longer important whether the motions are realistic or not: paradoxical and peculiar movements of a toy would now add a humorous note and make the game more attractive.

Kinds of Dynamic Toys

The vast massive of dynamic toys need being classified and systematized for the sake of more detailed analysis of their developmental significance, on the one hand, and for the sake of determining their age orientation, on the other hand. The classification of dynamic toys has become possible as soon as different criteria had been elaborated. They are:

- 1) presence of an image;
- 2) type of movement – toy's own motions and motions of tools or devices;
- 3) complexity of the movement's control.

Just as any classification, the division of the toys into classes which has been presented in this paper is quite a relative one and doesn't exhaust the whole variety of toys, every toy being really unique to a certain extent. Nevertheless, we've made an effort to highlight the most distinctive features of dynamic toys according to the criteria mentioned above.

First of all, dynamic toys are to be distinguished according to the **presence or absence of an image**, a certain character performing a certain movement. Some dynamic toys are

shaped as being this or that living creature, others – are not, being just a ball, a stick with a disk, or something of the kind.

Dynamic toys *which are shaped as if they were animated beings* produce similar motions which a corresponding living creature used to produce in nature (being a real human being or an animal). It becomes animated when it is used – active, full of energy. It starts either climbing, or tumbling, or doing something useful and quite recognizable: blacksmiths and woodcutters would work for hours, mountaineers and chimney sweeps would climb up the rope with an effort, etc. If it is a figure of an animal or a bird, it can be recognized not only by its outward appearance, but by some peculiar actions (movements) which are typical of the corresponding living creature as well. The squirrels would hop, the bull-calves would jiggle, the woodpecker would peck the tree, and the hens would peck up the grain. The only exception from the rule is made by modern variations of the Bogorodskoe toys, which humanize and personify the animal characters, who, therefore, start performing some very human actions (e.g. the bear hitting the computer keyboard).

The variety of dynamic toys *having no animate image* seems smaller at first sight. But possibilities for sophisticating movements appear to be almost infinite in this case. The variety of humming tops, skittle-grounds, balancers of some sorts is really enormous as far as their organization and the complexity of their actions are concerned.

It would be interesting to mention in this connection the fact that for pre-school children there exists practically no difference between the toys *with* and *without* an image: they animate both of them and empathize the toy bull-calves and the toy hens just as well as the balls on the skittle-ground.

According to the type of actions dynamic toys fall into the following groups:

- **Push cars** – toys with wheels, which a child should pull by the rope or push in front of him/herself holding them by a handle (stick). They can include the small drums, the flying butterflies, the rolling balls, etc. The playing potential of such toys is usually exhausted when a child reaches the age of 3.

• **Walking or hopping figures** – toys which show the characters' movements (the bull-calf walks, the squirrel hops, the caterpillar wriggles, the ducks walk, etc). Some toys are made in the form of trolleys. In some toys the swaying is maintained by the centre of gravity displacement, in some others – by the "law of the out-of-round wheel" (author's term). These toys seem to be interesting for the children aged from 2 to 4, when they are capable of launching a certain activity as well as understanding that these are they themselves who are the sources of the toy's movements.

• **Swaying or floating toys** – toys whose actions are based on observing the pendulum rule or (sometimes) the laws of gravitation. A small rocking horse being pulled to the utmost point doesn't stay there, but finds a balance by producing the gradually slowing down movements. The same principle lies in the basis of toy birds flying in the air or swaying with their wings open.



Pict. 1. Flying bird "the Goose Martin and Nils"

The floor-standing toys, such as a rocking-horse, or a camel, are operated otherwise. The child, having mounted such a toy, starts rocking him/herself energetically and thus keeps the toy moving. The swinging movement of the "inner pendulum" which imitate the toy's movement helps the child to feel clearly the extreme points and the balance point between them. Such toys are relevant for the children from 2 to 6 years old.

• **Rotating toys** – mobiles, tops, revolving objects – move round their axes (either quickly or slowly) and their spinning movements force

the child, to repeat them. The age range for using rotating toys is really very wide. They first appear being fixed above the cradle of a baby in its infancy and remain interesting for children for the whole of their preschool and school periods. Typical rotating toys are various manual tops: the big ones which are launched with two palms by using a special holder and/or a wire; the small ones which are started with fingers.



Pict. 2. Tops palmar and finger

This kind of toys manifests the realization of laws of centrifugal and centripetal movements as well as the laws of balance and inertia. Revolving tops can also be magnetic and look like an apple, a dancer or a propeller. The rotation in each cycle of the movement can be either complete or renewed, supported.

• **Rolling toys** – different objects which are to be driven – balls, jars, wheels etc. These are favorite activities of children throughout many years. There is a set of designs of mobile toys united under the name of "Kugelbahn" ("path for balls"). They can be either stationary (fillets, parallel cores, small plates designed in the form of a rack of different forms) or collapsible (some kind of a "designer" to be driven either with opened, or closed, or rotary parts). These toys of different complexity are intended correspondingly for children from 1 to 10 years old (or even older). Other rolling toys are more complicated from the point of view of how they are operated. We mean, for example, games like "catch-a-wheel" where the wheel rolls along (down) the road; or "keep-a-wheel" where the wheel is balancing on the cord. Actions of gravitation forces, inertia, friction, and rolling are realized in this kind of toys in the most bright and various ways.



Pict. 3. Simple stationary track sets / kugelbans

• **Tumbling figures** – toys which look, for example, like a gnome tumbling on the top of the hill, or an acrobat doing his tricks on a ladder (or on a crossbeam, or on parallel bars), or a diving dolphin, etc. These toys move under the influence of gravitation and inertia forces and some of them are based on the pendulum law work. The center of gravity (while the toy moves by the inertia) is being displaced and reaches either the top of the figure or its lowest part – which allows the toy to tumble. There is a set of tumbling figures, whose actions can be complete in every cycle of their movement – from top to bottom, or they can be renewed, supported. The age group for these toys is that from 2 to 6 years old.



Pict. 4. Gnomes tumble

• **Climbing figures** – toys which look like a bear or a climbing clown (to lift such toys by pulling the strings both hands are needed), or a rock-climber, or a chimney sweep (to be lifted with one hand), etc. in this case it is necessary to adapt a right rhythm of movements and amplitudes to

hands. Friction and rhythmical movements allow the figures to climb up overcoming the actions of gravity forces, which then move the figures down. The child is capable of coping with such toys at the age of about 3 years old (with the “one-hand” toys) and of 4–4, 5 years old (with the “two-hand” toys).

• **Knocking figures** – toys which move reciprocatingly (the hens peck, the blacksmiths work with the hammers, the woodpeckers peck the trees while moving down the tree trunk, etc.). The toy is moved either by means of swaying the hanger, or by moving the base bars, or by a certain springing mechanism. The simpler toy’s movement (swaying) can be fulfilled by the children already at the age of 2, 5 years old the more difficult one – by the children of 3–3, 5 years old.

We have mentioned here only the most typical kinds of dynamic toys. There certainly exist some other kinds of them, but it seems impossible to cover all of them in one paper.

Alongside with the toys reflecting various characteristic ways of animal or human movements, one can single out those toys which include toys the use of some tools (devices). The first type of toys demonstrates the movement itself and we examined them earlier. The second one would include those toys **whose actions are based upon using certain tools (devices)**. (Blacksmiths use their hammers and an anvil, woodcutters cut the log, the hussar drums, etc.).



Pict. 5. Bogorodskaja toy “For firewoods”

Dynamic toys differ considerably **in their operational complexity**. There can be singled out **5 levels of operational complexity** of dynamic toys.

The 1st level – an elementary purposeful action and observation. The child's own playing actions here are minimal – they are only needed to properly correlate the object with the surface of its action. (For example, to put a ball into a groove and observe its movements.)

The 2nd level – a double-beat action (e.g. to put a toy-somersaulter on a ladder by correlating the slit of the toy and the lath, and to set it free; or to pull the string and set it free in order to make the toy-bird flap its wings; or to put the toy-bull on the inclined plane and to shake it in the right direction in order to make it start walking).

The 3rd level – an action which requires more accurate coordination of movements and more coordinated hands' movements (e.g. pecking chickens, launching a whirligig with both palms, etc). Small whirligigs can be referred to the level of fingers' actions, as well as manipulations with a trolley consisting in the correlation of the toy's movements with the child's own movements.

The 4th level consists in rhythmical actions of one or both hands (synchronical or alternating), e.g. playing with the toy-woodcutter. The 4th level contains rhythmical actions of palms (pressing and unclasping), e.g. an articulate acrobat-dolly on a rope/horizontal bar.

The 5th level contains a complicated sensory motor coordination – a timely adequate reaction which takes into account quite many factors (e.g. inertness, distance, front and back space of one's body, changing of balance, legs' movements, etc.). These are different toys with a balance, complicated manipulations with whirligigs, etc. The 5th level also includes such types of toys which could be put in motion with the help of child's legs, e.g. labyrinths. Such modern and really complicated toys as an elevator (where the ball is not just rolling down but is rising by means of rolling it up from one floor to another, thus overcoming the gravitational forces); or a juggler with a spinning top in the form of a hourglass who is tossing up/rolling on a cord which is pulled between the two sticks – demand really virtuosic actions. The 5th level contains a collective control over the toy (e.g. the team foot beam, "catch-a-wheel"). The 5th level can be further subdivided into a few sublevels, but such a more detailed classification exceeds the bounds of the current research.

The age-specific addressing of the toy is probably estimated by measuring the degree of complication of actions of a child playing with it. It can be aimed at drawing some guidelines in relation to the normally developing children. Even a 1 year-old child can put the ball into the groove and observe its movements (the 1st level). At the age of 1,5 the child can put the toy-bull on the small plank and observe how it is coming down in case its swinging movement goes in the right direction. But if the toy-bull has suddenly stopped, only the child of 2,5 can restart it again (the 2nd level). Children of 3, 4 can master the whirligigs (the 3rd level), and children of 5 can move the toy-steeplejack by means of alternate and rhythmical actions of both hands (the 4th level). The hand-and-feet beams could be used only by the children of 6. And the juggler, a toy of the highest complication level, can be used by children of 10 and older. There is a number of toys which have a broad age range, each phase solving its own new tasks. And the levels of actions' complication of different types of bowling alleys vary from the first to the fifth level.



The

Pict. 6. Building set – complex design

Developing Significance of Dynamic Toys

What gives the dynamic type of toys to the child's development? At the first sight, they are rather simple and seem to require minimal intellectual and physical efforts. Teachers often attribute such games to making fun. But, actually, such toys significantly invest into child's development.

A peculiar phenomenon can be observed when a baby is playing with the dynamic type of toys: children tend to imitate the toy's movements. For example, a girl of 2, holding the peck-

ing toy-chickens in her arms, helps it to find a seed by bowing her head and showing it how to peck. Similarly, a boy of the same age while playing with the toy wood-cutter and being unable to do it properly tends to bend himself down in the attempt to make the toy produce the same action. The examples show that children tend to identify themselves with the toy and, therefore, produce similar actions.

It is interesting that such identifications happen not only during the play with “animated” toys. A child of 2 would imitate the swinging movements of a whirligig. A child of three would spin like a whirligig while playing with it and then fall down on the side. A child who plays with a somersaulting toy-man would imitate its acrobatic actions, learning how to somersault from the toy. Examples of simulative activities presented above were observed when watching the playing children of 22 months as well as the children of five. These facts gave us an opportunity to further develop the idea that dynamic toys are quite significant for the child’s development.

The main peculiarity of children’s perception consists in the fact that children have proved to be more sensitive than adults as far as the connection with the environment is concerned. They absorb some impressions and then identify themselves with events which happen around. This leads to arising inclinations of children to repeat somebody else’s actions. Those children who are active in observing other people’s movements experience an inner corporal-sensory playback as well as produce a subsequent imitation. Many experts suggest that imitation is really the leading mechanism of children under 7 development. It has been defined as a peculiarity of pre school children by many scientists and educators, neuropsychologists and correctional teachers. They all believe that it is an important and necessary phase of children’s development.

The discovery and further studies of the so-called “mirror neurons” in late 20th and early 21st c.c. explain the above phenomenon on the physiological level. “Mirror-neurons” are those neurons which are agitated both in case of one’s own activities and in case of human observing the activities of other people. The researchers have shown that “mirror-neurons” are involved in the development of speech, understanding other

people’s behavior, empathy and the development of human culture in general. It is significant that “mirror-neuron” activity is not observed in children with autism.

Our own observations have shown that these are not only other people’s activities which we tend to imitate but their choices of games and toys as well. We have repeatedly observed the obvious connections between the child’s playing with dynamic toys and his/her attempts to produce movements. A child puts the toy in motion, watches it, likes it and imitates its movements until his/her own movements become interiorized. Playing with dynamic toys requires a high degree of integration of numerous sensory stimuli of both the body and the toy. As a result, more accurate and quicker responses are formed. Later the toy’s movements are more and more accurately reproduced and differentiated, regarding the whole variety of conditions.

The child’s imitation of a toy’s motions is not always there. It emerges much later than the imitation of human activities. This can be explained by the fact that a human being is really more active than a toy, which, even being active and dynamic, still remains just an instrument in the child’s hands, its movements emerging as a result of the child’s own activities.

Emotional involvement in movement indicates that while playing with dynamic toys the child’s “ego” seems to form a unique whole with the toy and is then brought outside. An emotionally involved child concentrates on movements, follows them with his/her eyes and sighs contentedly when a moving object stops. The child’s self-identification with the toy’s movements is by all means accompanied by his/her deep emotional involvement in the movement. Moreover, according to the results of long-term research, no imitation of toy’s movement arises in case the child is not excited, not emotionally involved. For example, mentally retarded or autistic children who vividly see toys’ movements, do not tend either to demonstrate any concentration on toy’s movements or to participate in these movements. Children apprehend a moving toy as if it had nothing to do with them and do not even try to imitate its actions.

Our research has shown that children do not frequently imitate mechanical or electronic toys,

and if they do, their own movements tend to be rather primitive and no improvement or progress of any kind is observed.

On the contrary, dynamic toys become, so-to-say, "infectious" for a child who starts imitating various movements of either an object or a creature, his/her own movements being not at all mechanical. Interrelationship between inner and outer movements is that very relation that manifests the child's attitude to the world outside his/her own "ego" which is still under the development. These experiences by all means, tend to promote growing self-sentiment and self-consciousness of a child.

This is a vivid example of the so-called "feeling of the different by oneself" which is described by D. B. Elkonin [10]. The correlation of self-sensation (inner perception, self-perception) and perception of the "different" (this time it is a toy) tend to come as close to each other as to form the basis for "disclosing oneself" and "subjectivity emerging" (D. B. Elkonin). While correlating the perception of his/her own movements with the movements of a toy the child accomplishes **the transition of inner perception into the outer form**, and *vice versa*, which, as the result, on the one hand, enlarges the child's living space and, on the other hand, sets certain boundaries of what is one's own and what is somebody else's or something else's. In this the beginning of empathy and one's joining to the different can be observed.

This very perception of one's own movements in repeated movements of a toy constitutes the basis for the child's perceiving him/herself in the world as well as the world in him/herself.

These are mainly the children of 4 or younger who demonstrate the keen emotional involvement in toy's movements. After the age of 5–6 the child does not so readily imitate the movements of dynamic toys, their role, however, still remaining great as they help him/her to feel his/her own movements [11]. The toy does not only show the child its own movements but also initiates his/her imitational activities as well as establishes a certain **feedback** which becomes the result of whether the imitation appears to be successful or not. It is important that the child gets corrections from the toy itself but neither from adults nor from other children. Dexterity, proportionality, adequa-

cy of child's movements and actions are indirectly reflected in toy's successful actions. While trying to properly operate the toy, the child tends better feel and regulate his/her own movements, to try different movements and thus improve the performance.

When the child reaches the school age both exercising one's own movements and training them become an independent task which is solved with the help of different training simulators of movements and sport facilities are also to be used.

Moreover, dynamic toys provide an opportunity for experiments as they reveal characteristics and regularities of the mechanical movement; while playing with these toys the child tends to learn how to control them by him/herself.

Dynamic toys if they are wisely used and selected may render assistance in correcting such peculiarities of child's development as ADHD, ADD, MR, IA and other motor and emotional disturbances. Explicit and bright movements of the toy, the necessity of singling out its certain properties and acting in full accordance in each single case, alongside with variability of character and speed of actions of dynamic toys make them a really wonderful therapeutic material. Dynamic toys motivate the child to produce the independent movements. They suggest the character of these movements and stimulate adequate actions on the part of a child. Toys are capable of attracting and directing attention in cases where direct contacts are either impossible or ineffective. The fact is that the same toys tend to influence different children in quite different ways. Something that would help one child to come out of his/her self-absorbed mood would help another child to calm down and concentrate attention, and would bring to just another child an experience of alternating periods of movement and quiescence showing them in their vivid opposition. Such toys can help many children to advance from the situational interest to the more stable concentration, and, further, to purposeful observation and action.

Two vectors are combined in dynamic toys in their potential forms: that of self-perception development and that of a cognitive development (the movements "in" and "out"). This property shows a unique significance of dynamic toys in the child's development.

References

1. Ajers A. *Dzh. Rebenok i sensornaja integracija. Ponimanie skrytyh problem razvitija.* M., 2009.
2. Bernshtejn N. A. *O postroenii dvizhenija.* M., 1947.
3. Kenig K. *Vospitanie chuvstv i telesnyj opyt.* M., 1999.
4. Karjagina T. D. *Filosofskie i nauchnye konteksty problemy empatii // Konsul'tativnaja psihologija i psihoterapija.* 2009. № 4.
5. Kosonogov V. *Zerkal'nye nejrony: Kratkij nauchnyj obzor.* Rostov-n/D, 2009.
6. Maksimova E. V. *Urovni obshenija. Prichina vozniknovenija rannego detskogo autizma i ego korekcija na osnove teorii N. A. Bernshtejna.* M., 2008.
7. Ramachandran R., Oberman L. *Razbitye zerkala: teorija autizma // V mire nauki.* 2007. № 3.
8. Semenovich A. V. *Vvedenie v nejropsihologiju detskogo vozrasta.* M., 2005.
9. Smirnova E. O., Abdulaeva E. A. *Uslovija stanovlenija prostranstvennogo obraza Ja v rannem vozraste // Kul'turno-istoricheskaja psihologija.* 2009. № 3.
10. Shtajner R. *Vospitanie rebenka s točki zrenija duhovnoj nauki.* M., 1993.
11. El'konin B. D. *Oposredstvovanie, dejstvie, razvitie.* Izhevsk, 2010.
12. Steiger Eva, Ivan *Kinderträme.* Spielzeug aus zwei Jahrtausenden. München, 2004.
13. Emmi Pickler. *Lass mir Zeit:* <http://www.pikler-hengstenberg.at/pdf/zeit.pdf>.