

**Control of Level of Challenge and Its Effect On
Task Persistence; A Study Of
Csikszentmihalyi's Concept of Flow**

by

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(ABSTRACT)

Csikszentmihalyi's (1975) concept of flow was examined in a sample of 81 four-year-olds. Intrinsic motivation to continue playing, measured by the number of attempts to toss a bean bag through a target, was observed in both a choice and an assigned condition, order counterbalanced. In the assigned condition, subjects were randomly assigned to an easy or hard level of challenge, whereas in the choice condition, subjects could control the level of difficulty of the game by varying their distance from the target. Children in the choice condition made significantly ($p < .05$) more attempts than did children in the assigned-hard condition, and subjects in the assigned-easy condition made significantly ($p < .05$) more attempts than those in the hard condition, but there was no difference between the choice and easy conditions. No effect was found due to order in which conditions were received. Significant school differences were found in the choice condition only. Findings were

interpreted as supporting the hypothesis that choice of level of difficulty has a significant positive effect on intrinsic motivation to continue an activity.

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CONTROL OF LEVEL OF CHALLENGE AND ITS EFFECT ON TASK
PERSISTENCE: A STUDY OF FLOW

Play has typically been valued for its role in adaptation (Bruner, 1972; 1973; Rubin, Fein, & Vandenberg, 1983). Outcomes such as improved problem solving (e.g., Dansky & Silverman, 1973; Pepler, 1979; Sylva, 1977; Vandenberg, 1980), creativity (e.g., Lieberman, 1965; Singer & Rummo, 1973; Wallach & Kogan, 1965), and adjustment (Erikson, 1950) are often cited as justifications for play in programs for children. If play is valued as a dispositional state worthy of pursuit for its inherent qualities (Rogers & Sawyers, in preparation), then research on conditions that enhance or deter it are in order. Vandenberg (1985) pointed out that play needs to be studied as a dependent variable. Several recent studies indicate such a trend with research on the influences of child-rearing (Moore, 1985; Rubin et al., 1983) as well as other familial, peer, and ecological influences (Rubin et al., 1983). This study focused on situational constraints in relationship to motivation to continue playing.

Intrinsic motivation, active involvement (Rubin et al., 1983) as well as choice and control (Graef, Csikszentmihalyi, & Gianinno, 1983; Rubin et al., 1983) are key elements in defining play. This study was conducted to examine the

effect of control of the level of game challenge on play persistence.

The competence theories of intrinsic motivation (Gottfried, 1985) suggest that children play in order to deal effectively with their environment (White, 1959), through mastery of skills (Bruner, 1973; Piaget, 1962) or the mastery of traumatic events (Erikson, 1963; 1977; Freud, 1961). Indeed, empirical research has shown that infants enjoy having toys (Watson, 1972) or other stimuli (Sigueland & Delucia, 1969) that respond contingently to their actions. Control implies mastery. However, Csikszentmihalyi (1975) proposed that mastery is intrinsically motivating only to the degree that it is optimally challenging.

Flow, a term used by Csikszentmihalyi (1975) refers to a state experienced when intrinsically motivated persons are actively engrossed in activities over which they have control and for which there is immediate feedback. Csikszentmihalyi (1975; 1979) developed a model in which flow is depicted as the diagonal line created when the levels of skills and challenges, plotted on a graph, are equally matched. When the level of skills required is higher than the individual has available, the experience may be worry or, if more extreme, anxiety. If an individual perceives the skills required to be greater than the level of challenge, the resulting state may be boredom which may turn into anxiety if the ratio becomes too large. Csikszentmihalyi's model is

based on studies of play among adults, including rock climbers, chess players, dancers, surgeons, and basketball players. He also provided support for the role of enjoyment in flow among high school students. However, no studies have investigated flow in subjects younger than 15 years.

Choice is an essential condition for play and it may have a role in motivation. Through the use of an electronic paging device which signalled working adults to make records of their situations, Graef et al. (1983) concluded that ". . . the freedom to choose an activity is a key determinant to whether it will be experienced as intrinsically motivating" (p. 160).

Harter (1978) has refined White's (1959) model of effectance motivation in terms of success, optimal challenge, and intrinsic pleasure. In this study, an anagram task with four levels of difficulty, 3-, 4-, 5-, and 6-letters, was administered to a sample of 6th-grade students. When pleasure was examined as a function of perceived difficulty, a curvilinear relationship was obtained. That is, for those categories rated as very easy, easy, and hard, a positive linear relationship existed; however, enjoyment of the activity declined dramatically for the very difficult anagrams, even when the children were successful. Harter's study suggests that there may be an optimal challenge which exists for obtaining maximum pleasure.

The elements of choice and challenge set flow in perspective with play. In play, the child is in control and is free to move along the flow diagonal. Since the child may make goal alterations at any point (Rubin et al., 1983), it is possible to make an activity more challenging or less challenging depending on the level of skills available. According to Csikszentmihalyi (1979), play is a type of flow in which the player has control over the challenges; however, flow may also occur in a non-play state when there are external pressures to increase skills. In adults, and adolescents, the flow state appears to provide intrinsic motivation for participation in an activity. However, this concept also needs to be further investigated in young children as it may have implications for educational use.

The purpose of this study was to examine Csikszentmihalyi's concept of flow among a sample of four-year-old children. More specifically, this study was conducted to compare the differences in the number of attempts children made at a task when: (a) the children were given the opportunity to match the challenge to their level of skills; (b) a challenge was assigned at a level likely to be greater than the children's level of skills; or (c) a challenge was assigned at a level at which the skills were likely to be greater than the challenge. In all conditions subjects had choice over whether to play and how long they would continue to play.

Method

Subjects

The sample consisted of 81 children whose parents had consented to the child's participation in a study on play. The children were enrolled at a university laboratory school ($n = 18$) or at one of three other child care centers in the same town ($n_s = 39, 13, \text{ and } 11$). The total sample included 40 males and 41 females, and sex was approximately equally balanced within centers. To control for age, only subjects between the ages of 4-0 and 4-11 were invited to participate.

Procedure

A bean bag toss game was set up in a vacant room at each school. A board, 121.9 cm x 68.6 cm, with a hole, 17.8 cm in diameter, and 71.1 cm from the floor was the target (see figure 1).

Insert Figure 1 about here

A wide grid on the floor marked the distance from the target. The grid was marked 0 through 5 at 45.8 cm intervals from the board. These distances were selected based on norms for target throwing reported by Arnheim & Sinclair (1975). Starkweather (1966) used a similar task in a study on children's willingness to try difficult tasks. Willingness to try was measured by number of times the child attempted a

task. She found this task to have face validity and reliability ($r = .8$). In the present study, the number of attempts a child made at throwing the bean bag was assumed to reflect intrinsic motivation to continue the activity. The game was conducted at each school during indoor or outdoor play time. Each child was invited by the examiner to play a game and no child was forced to participate.

All subjects participated in both a choice and an assigned (no choice) condition, with the order of conditions counterbalanced. In the choice condition, subjects chose the levels at which they played, whereas, in the assigned condition, subjects were assigned one of two levels of challenge (easy or hard). When each child entered the room, the experimenter explained,

This is a bean bag game. I will tell you about the game and then, if you'd like, you may play it. To play the game, throw the bean bag through the hole in this board. Throw the bean bag as many times as you'd like, but each time you will need to pick it up. When you are ready to stop playing, please bring the bean bag to me so that I will know you have finished.

The child then received further instructions depending on the assigned condition. In the choice condition, all children were informed that they could stand at any level they chose on the grid and that they were also free to move about to other levels during the play period. In the assigned-hard condition, children were instructed to stand only at marker 5, which was 304.8 cm from the target. In the assigned-easy condition, children were instructed to stand only at marker

0, which was 78.7 cm from the target. For all conditions, the experimenter then said, "I cannot talk to you while you are playing because I have some things I need to write". To ensure that children did not continue with the task because of adult reinforcement, the experimenter then took a seat behind a screen located behind the subject and did not reestablish facial or verbal contact until the subject indicated readiness to cease the task. If a child asked a question, the experimenter restated the directions without expression and without eye contact.

The experimenter recorded the number of attempts, successes, total time, and the grid number (level of challenge) from which the bag was tossed. Two undergraduate and one graduate student served as experimenters. Pilot testing and training reflected 100% inter-rater reliability due to the simplicity of the definition of a throw (arm raised, bean bag propelled with force, not dropped) and a success (bag passes through the hole or lands on edge of hole and balances).

Results

The purpose of this study was to examine the conditions of choice and assigned levels of difficulty, (easy, hard), and their effect on game persistence. Results showed that subjects spent a longer period of time at the task during the

choice condition. Analyses indicate that subjects also spent more time in the assigned-hard ($M = 3.40$, $SD = 3.08$) than in the assigned-easy ($M = 3.17$, $SD = 2.07$) conditions; however, this longer period was partly due to the extra distance the child walked to pick up the bean bag. As a result of this and other individual distractions such as off-task exploratory play, time is not an effective measure for this study; therefore, time data were not used to test the hypothesis. The number of attempts was used as the measure of motivation to continue the activity. Means and standard deviations are reported in Table 1.

Insert Table 1 about here

One concern was whether there might be an effect due to the order of conditions experienced by the children. Some children who received the assigned condition first were noted by the examiner to be reluctant to return to the experiment. When this happened, most of them agreed to participate after being told they would have a choice of where to stand the second time. A preliminary analysis was carried out to address this question. With subjects from all schools combined, a two-way ANOVA with three levels of condition (choice, assigned-easy, assigned-hard) and two levels of order (choice first, choice last) indicated no significant

effect due to the order of participation, $F(1,78) = .48, p > .01$.

Another concern was whether there was an effect due to school. Using data for the choice condition only, an ANOVA indicated a significant effect due to school, $F(3,75) = 3.52, p < .02$. No differences were found however when using data for the assigned conditions.

To test the main hypothesis of the study, i.e. whether the element of choice was significantly related to motivation to continue playing (measured by number of attempts), a one-way ANOVA with condition as the factor of interest was computed. School and subjects within schools were used as blocking factors since preliminary analysis of the choice condition had indicated a significant effect due to the different schools. Further, since each subject did not receive every treatment, subjects were used as a blocking factor. Results revealed a significant treatment effect, $F(2,79) = 13.68, p < .0001$. To find the source of differences between treatments, mean comparisons were made using t-tests. No significant difference was found between assigned-easy and choice, $t(1,79) = 1.66, p > .05$. However, in the choice condition, subjects had significantly more attempts than in the assigned-hard condition, $t(1,79) = 4.98, p < .05$. Finally, the mean number of attempts in the assigned-easy condition was significantly greater than in the assigned-hard condition, $t(1,79) = 23.47, p < .05$.

Discussion

The results support the hypothesis put forth by Csikszentmihalyi (1975) that an optimal match between skills and challenges is related to intrinsic motivation, measured in this case by the number of attempts made to toss a bean bag through a target. In this study, the level of challenge was under the control of the child only in the choice condition, the condition which resulted in the highest participation rates. Since the level of challenge was under the control of each subject in the choice condition, the game could be called play. However, as Csikszentmihalyi (1975) proposed, a state of flow can exist even in the face of external pressure to advance one's level of skill. This was seen in the assigned-easy condition. Although the target distances had been based on published data for throwing skills of four-year-olds (Arnheim & Sinclair, 1975), the easy condition was somewhat challenging and thus apparently held the subjects' interest, resulting in an attempt rate that was only slightly lower than for the choice condition. The assigned-hard condition was so difficult that it resulted in almost no successes (5%) and failed to motivate the children to continue. These results are similar to those reported by Harter (1978) who also found that enjoyment of an activity declines dramatically when a point of extreme difficulty is reached.

If optimally challenging flow experiences are intrinsically motivating, as the results of this study seem to show, such findings may have implications for the educational process. As early as 1951, Hunt pointed out the importance of matching stimulating activities with the child's level of development. Elkind (1981) stated that teachers can promote cognitive development by challenging children who are in transitional stages of thought by questioning them at one level above their current level.

Observational records provide support for the notion that control is an important element in motivation to play. Several children who received the assigned-hard condition first were reluctant to return to the play room for the second phase of the experiment which was approximately one week later. In such cases, all but one agreed to participate after being told that this time they would be allowed to choose where they would stand to throw the bean bag.

In the choice and assigned-easy conditions, the majority of children quit playing after a success. Due to the low success rate of the assigned-hard group, 95% of those children quit on a failure. Of the children in the assigned-easy group, 91% ceased to play after a success, partly due to the large number of successes, whereas 65% of the children in the choice group did so. However, in the choice condition, the child was in control and thus more apt to be in a state of play where no external rules or goals were

enforced. Further analysis is planned to investigate the success rate in relationship to the level of difficulty chosen.

The significant school differences are difficult to explain. An important finding was that school differences were found only for the choice condition. The lack of differences on the assigned condition could be attributed to the low variance on the assigned-hard condition in which there were few attempts by children in any school. It is more difficult to explain the lack of school differences on the assigned-easy condition. Future studies should also attend to school influences on motivation to play.

One limitation of this study was that the degree of challenge in the assigned conditions varied for individuals. The distance from the target was varied systematically for the easy and hard conditions and was based on published norms. However, since children had varying levels of skill for this game, the degree of challenge also varied. Future studies should systematically vary the level of challenge by pre-assessing the subject's level of skill and adjusting the target distance proportionately.

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Table 1

Number of Attempts and Successes by Condition

Condition	n	Attempts		Successes	
		M	SD	M	SD
Assigned-Easy	35	18.11	15.42	8.69	7.19
Assigned-Hard	46	11.80	10.22	0.20	0.65
Choice	81	21.73	20.63	7.15	7.82

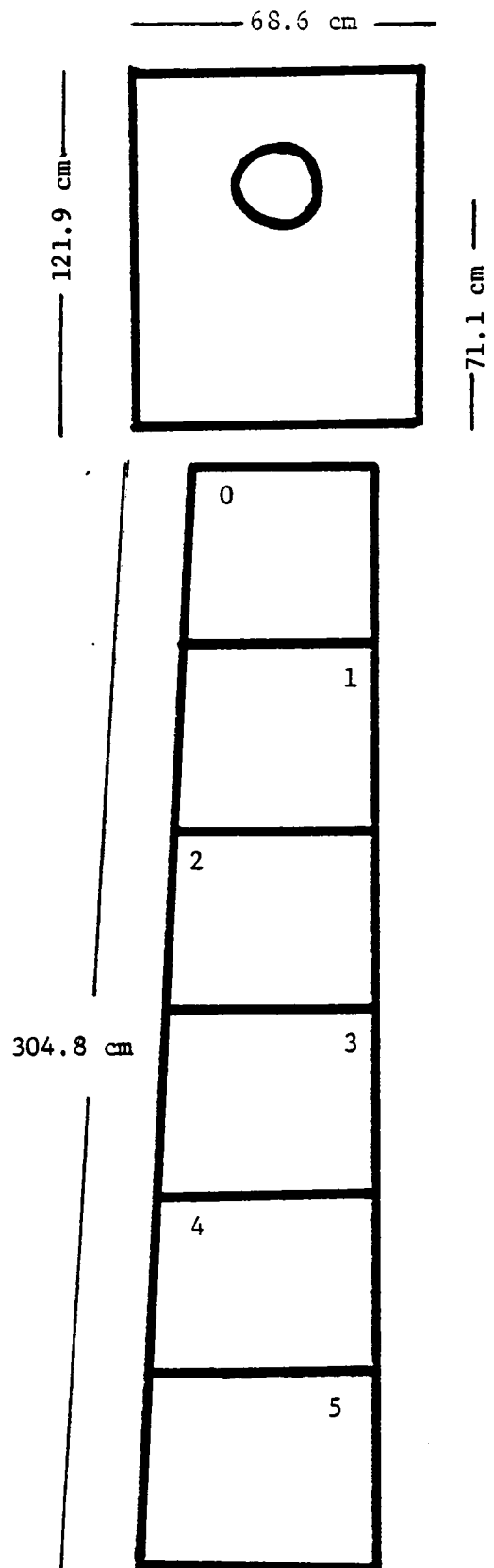


Figure 1: Physical Layout of Bean Bag Game

APPENDIX A
REVIEW OF LITERATURE

APPENDIX A. REVIEW OF LITERATURE

Since research has shown that a child's early experiences with learning may affect later attitudes towards school, it is important to provide children with positive experiences in learning (Holt, 1964; Deutsch, 1966; Elkind, 1981). In a world in which school and learning are increasingly identified by children as work, attention needs to be given to the opportunities for making the learning experience more fulfilling for each child. There are very few teachers that would not welcome the opportunity to teach a child who is self-motivated and enjoys learning.

It is commonly accepted in the field of education that children learn best when material is meaningful to them and when new material is presented at a level just above their current level of skills. This is in line with the Piagetian theory of equilibration in that when a new stimulus does not fit into an existing schema, the child will change the schemas in order to accommodate and incorporate new material. This study was conducted to examine how teachers may present materials to encourage more intrinsically motivated learning in children. When learning becomes intrinsically motivated, there is little need for smiley faces, stickers, stars, and other rewards

for success. Learning becomes an end in itself. Learning becomes a self-selected goal. Children no longer feel the pressure to succeed because of external forces such as parent and teacher recognition.

Csikszentmihalyi (1975) has studied the phenomenon of intrinsic motivation using an adult population. More specifically, he has attempted to explain what it is about an activity that makes it intrinsically motivating for an individual. Attracted to the arousal and information-processing theories (Berlyne, 1966), Csikszentmihalyi has developed his own approach, the concept of flow, which takes into account the whole organism.

The concept of flow may have interesting implications for educational use; however, previous studies have not employed subjects younger than 15 years of age. This study provides justification for the application of Csikszentmihalyi's concept of flow to four-year-old children.

Flow Theory

Csikszentmihalyi's model of flow (Csikszentmihalyi, 1975) is based on a study of the experience of playfulness in an adult population that appeared to be motivated by intrinsic rather than extrinsic rewards. Throughout his various studies of rock climbers, chess players, dancers, surgeons, basketball players, and other adults,

Csikszentmihalyi has found the following six elements to be common to the flow experience: (a) the merging of action and awareness; (b) the centering of attention on a limited stimulus field; (c) loss of ego; (d) control of actions and of the environment; (e) clear, unambiguous feedback; and (f) the autotelic nature of the activity (Csikszentmihalyi, 1975).

Although some activities may appear to have external goals, such as with the artist who creates paintings for a living, it is the self-satisfying experience of flow that remains the incentive (Csikszentmihalyi, 1975). According to Csikszentmihalyi, many people may in fact rely on some sort of external cues for entering into the flow state but this state itself remains the stimulus for continuing the activity. He has identified competition, material gains, and danger as potential elements that may motivate an adult to center attention and concentrate on the actions.

A model has been developed by Csikszentmihalyi to illustrate the flow experience (Figure 2).

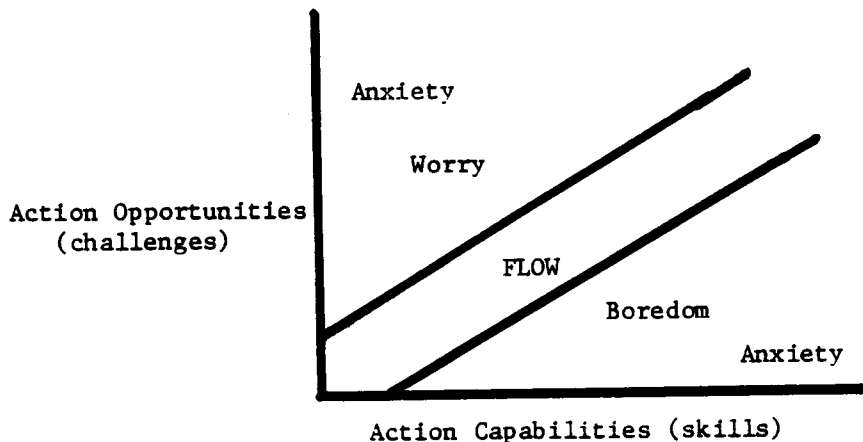


Figure 2: Csikszentmihalyi's Model of Flow

(Csikszentmihalyi, 1979, p.261)

The state of flow is experienced when the level of challenge is in balance with the individual's level of skills. When the level of skills required for the task is higher than the individual has available, the experience is that of worry. When an individual perceives the challenge to overwhelm level of skills, the resulting state is experienced as anxiety. If an individual perceives the skills required to be greater than the level of challenge, the resulting state is boredom which may fade into anxiety if the ratio becomes too large.

According to Csikszentmihalyi, if a person is bored or worried, intrinsic motivation is lost. A flow experience then is one in which a person is totally involved in the activity. "The activity presents constant challenges and there is no time to get bored or worry"

(Csikszentmihalyi, 1975, p.261).

Csikszentmihalyi has identified rock climbing, athletics, art, and creativity as prospective flow activities because of their infinite ceilings. He further proposed that the flow experience may occur in almost any context, although certain types of activities may more readily lend themselves to the state of flow (Csikszentmihalyi, 1975).

Graef, Csikszentmihalyi, and Gianinno (1983) examined intrinsic motivation as it occurs in everyday life experiences. A diversified group of urban lower-middle and middle-class working adults each carried an electronic paging device during a typical week in their lives. Each participant was signalled from six to nine times each day and for each signal, the participant made a written record which described their present situation as well as their emotional and cognitive states. The researchers concluded that ". . . the freedom to choose an activity is a key determinant to whether it will be experienced as intrinsically motivating" (Graef et al., 1983). Those people who did perceive their lives to be more intrinsically motivated were found to be happier overall. Those people ". . . with higher percentages of extrinsically motivating experiences rated themselves as less happy, less active, and more tense, described their lives as more boring, and also described their sense of

competence lower when using a challenge skill ratio" (Graef et al., 1983, p.163).

A study of 30 adult rock climbers was conducted to determine what attracts people to engage in an activity that most others see as dangerous and irrational (Csikszentmihalyi, 1975). Through personal interviews using the framework of the flow model, it was found that the rock climbers were attracted to the activity for the following reasons: (a) the unlimited range of action challenges, (b) the intense concentration the activity requires, (c) the feelings of competence and control-- all felt it was no more dangerous than driving a car, (d) the immediate feedback provided by the physical danger, and (e) the way that the actions of climbing became merged with the awareness of movement.

In a study in which high school students rated their activities, Csikszentmihalyi (1979) found that the students positioned their favorite activity at the appropriate extreme of the flow state, using dimensions from the model of the experiential state of flow. As would be expected, 80% of the students' favorite activities fell along the diagonal in the flow model (Csikszentmihalyi, 1979). Csikszentmihalyi studied these students again using the experiential sampling method. Students wore electronic vibrating units and when signalled, each student made a written record of his or

her state at that point. Results indicated that the classes rated higher on flow in the previous study were the ones in which the moods of the person were much higher when they were beeped in those classes.

In adults, the flow state acts as a strong motivator for participation in an activity. One question that has been raised regarding flow is its relationship to play. According to Csikszentmihalyi (1979), play is one type of flow but not all flow is play. The difference is that in play, the individual has chosen the goals, whereas flow can occur even when there are external pressures to increase one's level of skills. However, there do appear to be some elements that are common to both play and flow. More specifically, both assume the predominance of assimilation over accomodation.

Definition of Play

Play has become a popular topic of research in recent years. Although the literature on children's play is expanding rapidly, researchers have encountered difficulty in agreeing on a clear definition of this concept. However, there does appear to be considerable agreement on several factors that are characteristic of play behavior. Rubin, Fein, and Vandenberg (1983) have identified the following six factors as common elements of play: (a) the behavior is intrinsically motivated; (b) attention is to means rather than ends; (c) play is

organism rather than stimulus dominated; (d) play activities often involve pretense; (e) there is freedom from externally imposed rules; and (f) the participant is actively engaged in the play activity. Different theorists will vary with reference to the definitional restrictions they impose (Rubin et al., 1983).

Rubin et al. (1983) pointed out that the intrinsically motivating behavior in play may be due to positive feelings of mastery (White, 1959), opportunities to exercise newly acquired skills (Piaget, 1962), or from the pleasurable arousal state often associated with play (Berlyne, 1966).

In play, the child is in control. The child selects the goals of the activity and may make goal alterations at any point (Rubin et al., 1983). These authors have also suggested that this characteristic helps to distinguish play from other activities which may be intrinsically motivated but which are directed toward some specific goal. Thus they differentiate play and enjoyable work in terms of the goals.

Further, according to those authors play is organism dominated and thus the child can decide what can be done with an object, independent of the object's properties. In this sense, play is differentiated from exploration which is stimulus dominated.

Another characteristic which distinguishes play from other behaviors is its relationship to instrumental behaviors which, according to Rubin et al. (1983), restricts play to behaviors generally referred to as pretense. Thus to be viewed as play, the child needs to pretend "as if" an object were something else.

Piaget's Theory

In his book, Play, Dreams, and Imitation in Childhood (1962), Piaget defined play as a state of disequilibrium in which assimilation dominates accommodation in varying degrees. According to Piaget, play is most prevalent in childhood because ". . . the characteristics of all behaviors and all thought are less in equilibrium in the early stage of mental development than in the adult stage" (Piaget, 1962, p.147).

Piaget acknowledged the following six characteristics often cited as the main criteria of play: (a) play is an end in itself; (b) play is spontaneous; (c) play is an activity for pleasure; (d) play lacks an organized structure; (e) play is free from conflicts; and (f) play may be overmotivated. In analysis of these criteria however, Piaget suggested that play is still best distinguished from other behavior by the state of disequilibrium that exists in varying degrees when there is a predominance of assimilation.

According to Piaget (1962), play is not always autotelic because even in the most simple game, the player may be interested in the outcome of the activity. Instead, he suggested that autotelism and heterotelism are best distinguished by behaviors in which assimilation and accomodation are still in equilibrium and those in which assimilation predominates in varying degrees (Piaget, 1962).

Piaget (1962) has further suggested that the intellectual activity of a child is as equally spontaneous as play. Again, the distinction between the two can be made along a continuum in which spontaneous behavior is uncontrolled and other behavior is to some degree controlled by society or reality. Thus, play is seen as assimilation of reality to the ego whereas more serious activity is seen in a state of accomodation to other persons and things (Piaget, 1962).

Piaget (1962) also suggested that although play may be an activity for seeking pleasure, the pursuit of pleasure is subordinate to the assimilation of reality to the ego. This can be seen in the child who reacts to an unpleasant experience through play. According to Piaget (1962), the child does so, not to preserve the pain, but so that the experience may become more bearable through assimilation of the activity to the ego. For example, if a child has experienced being a patient at the hospital,

it would not be surprising to see a similar experience re-enacted during dramatic play. Often this child will become the doctor and administer tests and shots to the other children who act as patients. Through this play episode, the child gains control of the situation and is able to cope better with the fears that are associated with this situation.

Further, according to Piaget (1962), symbolic thought may also be described in terms of assimilation. He has suggested that in daydreams and symbolic games, reality is merely being assimilated to the whims of the ego. Although symbolic thought has often been thought to be lacking in organization and meaning, it has been suggested by others that daydreaming during which an individual "plays" with ideas may be significant in later actions (McCall, 1974).

Piaget agreed with other researchers that play is free from conflicts. During play, the ego is in control and according to Piaget (1962), the conflicts of everyday life are transposed so that the ego is revenged, either by suppression of the problem or by offering an acceptable solution.

The final criterion, overmotivation, is also identified by Piaget as the predominance of assimilation over accommodation. In overmotivation, independent ludic incentives are formed to make an activity more pleasant.

Thus a child may make a game out of an activity such as cleaning up by pretending to be a giant lifting big cars into a box. According to Piaget (1962), the activity becomes ludic ". . . through a process used by the ego to integrate a reality which was independent of it and which sometimes required painful accomodation" (p.150).

Exploration versus Play

In a comparison of exploration and play, Hutt found that play is more dependent upon contextual and mood variables (Hutt, 1979). In a study using three temporal schedules that made a toy available every other day, daily, or twice a day, Hutt found that spacing the trials or exposures produced the most play (Hutt, 1979). Hutt (1979) put play into a broader category of arousal-modulating behaviors and differentiated exploration and play by the arousal level of an organism. According to her, exploratory behavior ". . . occurs when novel stimuli raise one's arousal level and the organism seeks to reduce the stimulation, whereas play occurs when the arousal level is low and the organism seeks to increase its level of stimulation" (Hutt, 1979, p.57). Similarly, heart rate variability has been found to be higher in play than in exploration, an indication that the child is relaxed.

Hutt has further suggested that when a child plays, the child is signalling mood state which she describes as,

"I feel happy enough, I am not anxious; I feel relaxed enough to play, to do as I wish; any constraints that apply, I entirely disown" (Hutt, 1979, p.190). However, as soon as there are external constraints, the activity ceases to be ludic and is no longer play. She has also suggested that during play, there is a temporary suspension of the cortical information-processing functions while at the same time metabolic restitutive functions are allowed to take place (Hutt, 1979). At the cognitive level, Hutt characterized play as a "time-out" phase for consolidation of information acquired during epistemic activity.

Research conducted by Collard (1979) has similarly supported the hypothesis that exploration seeks to reduce the level of stimulation whereas play seeks to raise it. In a study using babies from lower-class homes, middle-class homes, and institutions, Collard found that when the institutional babies received a high level of stimulation by a mass of objects they showed more exploration responses. On the other hand, when the institutional babies were stimulated only by a few objects, they tended to exhibit more play responses. Further, more exploratory responses were shown by the home-reared babies when the experimental toy was novel to them, and more play responses than exploration were typical near the end of the period. Collard has suggested

that exploration is the primary activity in which the perceptual properties of objects are learned, whereas play facilitates learning functions of objects and the generalization of actions to other situations (Collard, 1979).

Berlyne (1970) has classified infant voluntary behavior as exploratory and instrumental. Hulsebus (1973) and Watson (1966) suggested that instrumental or goal-directed behavior involves actions which have an effect on the environment and thus play an important role in motivation. According to Collard (1979), much instrumental behavior may be learned in play when an infant is intrinsically rewarded by the outcome of his or her actions. The child may then generalize these to other situations.

APPENDIX B
REFERENCES

APPENDIX B. REFERENCES

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APPENDIX C
BASIC MOTOR ABILITY TEST NORMS

APPENDIX C. BASIC MOTOR ABILITY TEST NORMS

Subtest 2: target throwing

Purpose: To test eye-hand coordination.

Materials needed: A target that consists of three squares, the middle square measuring 5 inches on each side, the intermediate square measuring 11 inches on each side, and the largest square measuring 18 inches on each side. The target is attached to a wall with the bottom 4 feet from the floor. Fifteen 4 × 5 inch bean bags are used as projectiles to be thrown at a target.

Procedure: Stand those subjects ranging from 4 to 5 years of age behind restraining line 7 feet from the target and those from 6 to 12 years of age behind a restraining line 10 feet from the target. The difference in throwing distance is to minimize the adverse effects from the lack of arm strength in younger children. Demonstrate by throwing two bags at the target while explaining that the small square has a point value of 3, the middle square has a point value of 2, and the large square has a point value of 1. Then tell the child to score as many points as possible in 15 throws.

Scoring: The total score is determined by adding the points earned in the 15 throws. If a bean bag lands on the line between two squares, the larger score is awarded.

*Arnheim, D. D., and Sinclair, W. A.: The clumsy child: a program of motor therapy, St. Louis, 1975, The C. V. Mosby Co.

PART II. BASIC MOTOR ABILITY TEST NORMS*

SEX: Male AGE: 4 years

Percentiles	Bead stringing	Target throwing	Tapping board	Back and hamstring stretch		Standing long jump	Face down to standing	Static balance	Chair push-ups	Agility run	
				cm	inch						
90+	10	22	40	52	28 3/4	130	51 1/4	10	18	9	20
75	7	16	35	45	25 7/8	100	39 3/8	8	15	7	18
50	5	10	32	36	22 3/4	89	35	6	10	5	16
25	3	3	20	27	18 3/4	60	25 5/8	4	7	2	12
1	1	1	5	18	15 1/4	30	11 3/4	2	3	0	7

SEX: Female AGE: 4 years

Percentiles	Bead stringing	Target throwing	Tapping board	Back and hamstring stretch		Standing long jump	Face down to standing	Static balance	Chair push-ups	Agility run	
				cm	inch						
90+	10	22	38	52	28 3/4	129	50 3/4	10	17	8	20
75	8	17	35	47	26 3/4	99	39	8	15	6	18
50	5	11	33	36	22 3/8	89	35	6	11	5	16
25	3	3	19	28	19 1/4	60	23 5/8	4	8	2	12
1	1	1	7	19	15 3/4	30	11 3/4	2	2	0	6

APPENDIX D
TASK RECORD FORM

APPENDIX D. TASK RECORD FORM

CHILD (code#) _____ SEX _____
DATE OF TEST _____
SCHOOL _____
CONDITION _____
TREATMENT SESSION (circle one) 1 2
TOTAL # OF ATTEMPTS AT TASK _____
TOTAL TIME AT TASK _____

APPENDIX E
PARENTAL CONSENT FORM

APPENDIX E. PARENTAL CONSENT FORM



COLLEGE OF HUMAN RESOURCES

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Blacksburg, Virginia 24061 - 8299

DEPARTMENT OF FAMILY AND CHILD DEVELOPMENT (703) 961-4794 or 4795

April 24, 1985

Dear Parent:

Play has been said to be an important factor in children's learning. We are planning a study on play and its relationship to interest in continuing a task. Each child will be invited on two different days to play a game and the level of interest in the task will be recorded. The activity will be conducted at your child's school during a free-play time. No child will be forced to participate in the project against his or her will and no risks are involved.

All children will be identified on the record sheets by use of a code number and all information obtained about a child will be kept confidential. We will be happy to share our findings with you upon completion of the study in July.

If you have questions or concerns and would like more information about the study, please contact Karen Kidd () or Dr. Cosby Rogers () at Virginia Tech. If you give permission for your child to participate in this project, please return the form at the bottom of this paper to your child's teacher by Friday morning, April 26. Thank you for your co-operation.

Sincerely,

Karen D. Kidd

Dr. Cosby S. Rogers

I acknowledge that I have been informed about the nature of this study on children's play and I give consent for my child to participate.

NAME OF CHILD: _____

SIGNATURE OF PARENT: _____

APPENDIX F
SUPPLEMENTARY TABLES

APPENDIX F. SUPPLEMENTARY TABLES

Table 2

ANOVA for Effects of Subject, Treatment, and Session

Variable	DF	Sums of Squares	F Value	PR>F
sex	1	145.01	1.24	0.23
subject (sex)	79	37182.77	4.02	0.00
treatment	2	3185.49	13.59	0.00
session	1	56.34	0.48	0.49

Note.- Data for all schools were combined for this analysis.

Table 3

Means for Number of Attempts by School for Choice Condition

School	n	Attempts	SD
School 1	18	12.33	7.91
School 2	39	26.85	24.25
School 3	13	13.23	11.66
School 4	11	29.00	22.06

Note.- (1) university lab school; (2) half-day church-based center; (3) full-day church-based center; (4) full-day center.

Table 4

Means and Standard Deviations for Time at Task

Condition	n	M	SD
Assigned-Easy	35	3.17	2.07
Assigned-Hard	46	3.40	3.08
Choice	81	4.12	3.51

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