# CHAPTER TWO

## Flow: Intrinsic Motivation, Cognitive Ease and Task Enjoyment

Currently, flow is one of three closely-related schools of thought providing a framework for the study of motivation and performance, the other two being cognitive evaluation theory and goal orientation theory. Inasmuch as all three are concerned with intrinsic motivation, there is considerable overlap in the phenomena that are described and potential confusion in different terms that represent essentially the same thing. In an effort to bring greater conceptual clarity to the topic of intrinsic motivation and classroom complexity, the reasons why people choose to engage in work for its own sake are examined in terms of personal autonomy, perceived competence, mastery goals, performance goals and the experience of flow.

### Approaches to Intrinsic Motivation and Interest

According to most contemporary approaches to motivation, a person is intrinsically motivated who engages in a task because it is interesting for no other reason than the task itself (Amabile, 1990; Berlyne, 1966; Csikszentmihalyi, 1990a; Deci, 1972; Deci & Ryan, 1985; Dweck, 1985; Harter, 1981; Hunt, 1965; Lepper, Greene, & Nisbett, 1973; White, 1959). In contrast to a general achievement orientation, this type of interest is increasingly viewed as field specific: the value one attributes to a particular subject matter that makes it worth pursuing primarily for intrinsic reasons (Schiefele, 1991).

When asked to explain what makes an activity interesting and how long-term task interest develops, researchers are likely to disagree (Renninger, et al., 1992). This presents something of a problem since intrinsic motivation cannot be defined apart from an activity. Typically, the problem is skirted by measuring motivational responses in light of tasks assumed by researchers to have inherent value to the subjects involved. Puzzles, games, and computer simulations are the activities commonly used as a background for testing changes in interest. But their use discloses little more than what researchers think will interest rather than bore their subjects. What these studies lack is some indication why these activities arouse and sustain interest.

Classroom studies of motivation take a different, but again not very heuristic approach to tasks. To give an example, individuals' subject matter preferences are used to measure interest in art, mathematics, and other courses. The *means* through which math preferences are formed, the lessons, assignments, instructional formats, and so on, are infrequently taken into account. Few assumptions, if any, are made about classroom tasks that may contribute to students' subject matter preferences, the major exception being studies examining the deleterious effects of excessive teacher control.

But classroom tasks should not be passed by, for the ways a subject like mathematics is taught may profoundly affect student achievement (Ames, 1992; Blumenfeld, 1992; Stodolsky, 1988). Take for example the effects of variety, identified by some as a factor in task motivation (e.g., Ames, 1992; Blumenfeld, 1992; Lepper & Hodell, 1989).

Depending on its use, variety can promote or hinder performance. Used for its own sake, conspicuous variety may distract students, encouraging them to overlook the subject matter. Attention-getting tactics, novelty, and the like may actually do harm by “heighten(ing) interest and attention at the expense of cognitive engagement” (Blumenfeld, 1992, page 273). Even though this is only one example, it seems prudent to consider carefully the instrumentality of tasks in motivation.

For the most part in its development, the construct of intrinsic motivation has been treated as a cognitive phenomenon. But in describing an intrinsically rewarding task, it becomes apparent that it is an affective experience as well: “a freely chosen activity which holds the attention and is a source of satisfaction or pleasure” (Jellin & Verduin, 1986, page 41). All current motivational theories, behaviorism excepted (e.g., Flora, 1990), attest that deliberate choice and affective enjoyment are integral dimensions of interest. Nonetheless, disproportionate emphasis may be given to one or the other aspect depending on the paradigm in use. Cognitive theorists tend to focus more on intellective aspects of task interest such as locus of control or subjective competence. The satisfaction or pleasure that accompanies interest is more the focus of affectively-oriented research. Both are needed, since “much of the initiation and regulation of one's behavior is better understood in relation to processes and affects within the person, rather than specific environmental events” (Ryan, Connell, & Deci 1985, page 25).[1]

Cognitive Perspectives on Task Interest: Control and Competence

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1. Environmental events include any extra-personal means through which an individual develops an internal or external locus of causality (Ryan, et al., 1985).

For over two decades, most of the information about intrinsic interest has come from the efforts of cognitive evaluation theorists and, more recently, goal orientation theorists. From cognitive evaluation come claims that intrinsic motivation depends on inner attributes, namely, *personal autonomy* and *subjective competence* (deCharms, 1968; Deci & Ryan, 1985; Ryan, Connell, & Deci, 1985). Goal theory, not denying that subjective attributions are critical, adds that individuals' intrinsic motivation can be affected negatively by attending *too much* to self-competence and control. Accordingly, the factor that promotes intrinsic motivation is a focus externally toward a task rather than a concern about the welfare of the ego. A number of descriptors have been proposed to capture this dichotomy: *learning vs. performance goals* (Dweck, 1986; Elliot & Dweck, 1988), *mastery vs. performance goals* (Ames, 1992; Ames & Archer, 1988), and *task vs. ego-involvement goals* (Nicholls, 1984a; Ryan, 1982). All pairs of terms are attempts to find a language to describe two distinctly different orientations toward work. In this dissertation, task- and ego-involvement are the preferred descriptors, but learning/mastery/task-involvement may be used interchangeably as can performance/ego-involvement to distinguish between intrinsic and extrinsic goal orientations.

*Personal Autonomy*

From the cognitive scientist's vantage point, a task is more interesting when an individual acts as an origin rather than a pawn, that is, when control is internalized rather than externally imposed (deCharms, 1968; Deci, 1995; Roe, 1953; see also Heider, 1958). This claim is graphically supported by classroom accounts of children who are allowed to choose and direct their own learning activities. They exemplify individuals absorbed in their work and are highly committed to learning (Nicholls & Hazzard, 1993). A good deal of clinical study has demonstrated that when individuals realize they may be pawns and not the originators of their own behavior, task interest is undermined (e.g. deCharms, 1976; Deci, 1971, 1972). Even the suspicion of external control detracts from the inherent interest of a task. The perception of internalized control--known also as personal causation and self-determination in the lexicon of motivation--is believed to enhance one's interest in a task (Ryan, Connell, & Deci, 1985). Presumably, all of this is brought about by the human need to feel effective, to be in control of one's behavior, to master one's environment (Ames & Archer, 1988; Deci, 1995; Maehr & Nicholls, 1980; Murray, 1938; Nicholls, 1984b).

Assuming that intrinsic interest is demonstrated when individuals attend to tasks when they are not obligated to do so, the most interesting tasks are those which allow students control over their actions (Deci, 1972, 1995). But no activity is necessarily interesting just because one has the freedom to do it. Activities are chosen because of some inherent quality that is attractive or rewarding, apart from the freedom to choose. Otherwise the choice of an activity operates for freedom's sake alone. Not everyone who realizes “I am free to do math” will inevitably say “I want to do math” given the opportunity. There must be other reasons for one's choice of a task that make it meaningful. Locus of causality accurately predicts what will happen when “I want to do math” is replaced by “I have to do math,” but by itself, autonomy sheds little light on what brings about the attraction in the first place.

*Perceived Competence*

In addition to autonomy, perceived competence is considered essential in defining intrinsic motivation as a cognitive phenomenon (Ryan, Connell, & Deci, 1985; Valås & Søvik, 1993; Weiner, 1986, 1992). Competence is generally explained in terms of the fundamental human need to feel effective in one's dealings (Bandura, 1977; Deci, 1995; White, 1959). Accordingly, interest depends on one's feeling of *control* or *efficacy* over the successful outcome of a task. For this reason a student faced with a math assignment who decides that it is hopelessly beyond reach will not be intrinsically motivated by it. Lacking the (perceived) necessary abilities, extrinsic means such as tangible rewards or unpleasant consequences may keep the person on task, but the activity itself will not be interesting because of external controls and inadequate skills. In this light, task interest is a function of the level of challenge present in a task relative to perceived ability.

Certainly the balance between task challenge and perceived competence regulates interest, however, according to goal theory, whether a person attributes success to *effort* or *ability* significantly affects this balance (Ames, 1992; Blumenfeld, 1992; Elliott & Dweck, 1988; MacIver, et al., 1991; Nicholls, 1984b; Weiner, 1992).[2] Individuals of

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2. The main thrust of goal research has been the study of effects resulting from one or the other goal orientation. Task involvement is strongly suggested to be superior to ego involvement in a number of respects: in enhanced intrinsic motivation (Butler, 1987; Koestner, et al., 1987), resistance to external control (Flink, et al., 1992), strengthened task attraction and learning intention (Seegers & Boekaerts, 1993), a preference for challenging work and risk taking (Ames & Archer, 1988; Elliott & Dweck, 1988), increased amount of time spent on learning tasks (Butler, 1987), better use of learning and problem-solving strategies (Ames, 1992), improved perceptions of competency (Brophy, 1983), development of new skills (Meece, et al., 1988), greater achievement (Butler, 1993), and pleasure derived from tasks (Spaulding, 1992).

similar aptitude may not agree whether a task is interesting or not because they view differently their ability to effect an outcome.

*Attributions of Effort and Ability in Task Performance*

Some individuals may find more challenging tasks more interesting because they attribute the outcome to effort, something they believe they can control. These individuals are said to be task-involved, their goals tends to focus on task mastery. Success is measured by criteria such as the percentage of problems right on an exam compared to a prior effort. The intent is to improve primarily for the sake of improving, in which case the means and the ends of the activity are the same. In other words, the goal is intrinsic to the task. If individuals try and fail, they fault their effort and are usually willing to try harder next time.

The same task can have a different effect on persons who are ego-involved, usually affecting self esteem. A concern with how well something is learned is replaced by a concern for performance. Ego-oriented individuals attribute outcomes to their ability, which they perceive as a stable trait, one which they cannot control (Ames, 1984; Weiner, 1992). To measure success, ego-involved learners turn their attention to others to see how well they fare on comparable tasks (Covington, 1984a). Disappointing results tend to have an amplified negative effect on ego-involved persons because, as they perceive it, improvement lies beyond their capacity and further effort will do little good (Fennema, 1985; Jagacinski & Nicholls, 1987). Consequently, they may be more cautious with challenges, preferring work that may be too easy. When an ego-involved student fails, self is the potential culprit and culpability is measured in relation to others' performances. Protecting or promoting the self may actually become the more interesting task (the activity with the higher personal value).[3] As defined, attributions of effort coincide with task-involvement; attributions of ability with ego-involvement (Figure 2.1).

**Figure 2.1 Summary of Contrasts between Cognitive Goal Orientations**

| ***Task-involvement*** | ***Ego-involvement*** |
|---|---|
| • attributions of effort<br>• task focus<br>• mastery oriented<br>• intrinsic motivation<br>• short-term rewards | • attributions of ability<br>• self vs. other focus<br>• performance oriented<br>• extrinsic motivation<br>• long-term rewards |
| ***Predictable Outcomes*** | ***Predictable Outcomes*** |
| • task performance determines level of mastery<br>• success results in mastery, new skills<br>• improved self-efficacy<br>• failure implies a need to try harder next time | • task performance determines self worth<br>• success reinforces extrinsic goals<br>• failure implies lack of ability, lessens willingness to try again |

*Conditions Affecting Task- and Ego-orientations*

According to Nicholls (1984b), task-involvement and ego-involvement are induced situationally. Conditions favorable to ego-involvement include competitive and test-like situations in which evaluation, the demonstration of ability and public self-awareness are accentuated (Ames, 1984; Carver & Scheier, 1981; Raynor & Smith, 1966; Ryan, 1982).

Moreover, the use of coercive control techniques promotes ego-involvement (Deci, Schwartz, Sheinman, & Ryan, 1981). The likelihood of task-involvement is assumed to improve in the absence of social-comparison and imperious conditions (Nicholls, 1984b). Based on the premise that children tend to internalize the orientations of their classrooms (Ryan, Connell, & Deci, 1985), the design of tasks and learning activities may profoundly shape children's "judgments about their ability, their willingness to apply effortful strategies, and their feelings of satisfaction" (Ames, 1992, page 263).

If situational variables induce goal orientations, then task elements probably play a significant role in shaping interest. In this connection, tasks may be considered in terms of their *incentive value* to students.[4] To gain more ground on why some tasks are interesting and others are not, it may be beneficial to identify the qualities that make tasks attractive for the sheer pleasure and satisfaction of doing them, the bellwether of intrinsic motivation (Deci, 1971).

According to Ames (1992) and Blumenfeld (1992), there are five task dimensions that may affect motivation: control, diversity, novelty, challenge and meaningfulness. Of these, meaningfulness may be the key to understanding student involvement. Other task dimensions such as variety, challenge and control will probably not be enough of an incentive if the task has little perceived value. Depending on the viewpoint, cognitive and affective theories of motivation describe different aspects of this perceived value.

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3. It is well-documented that the consequences of involving ego in task performance can deter achievement. Effort may be withheld deliberately in order to avoid the possibility of injuring one's self-concept (Covington, 1984b; Elliott & Dweck, 1988; Nicholls, 1976; Rollett, 1985).

4. Support for this view may also be found in Deci & Ryan (1985), who claim a desire for rewards motivates all forms of self-determination.

Foremost, a distinction is made between the intellective and non-intellective experience of personal rewards.

*Intellective Personal Rewards*

Generally speaking, a task is intellectually enjoyable or rewarding if it results in greater personal clarity or understanding. This tends to be the constructivist view that work is more interesting when students actively construe knowledge rather than passively absorb information (e.g. The Cognition and Technology Group, 1990; Kamii, Clark, & Dominick, 1994; see also Bruner, 1977; Dewey, 1902). In this connection, an intrinsic cognitive reward is a new awareness founded on prior knowledge, independent of extrinsic incentives.

As described by Davis and Hersh (1981), knowledge personally constructed can be a highly rewarding attainment, one which is accompanied by a "strong sense of personal aesthetic delight" (page 172). Finding or creating mathematical order can be attractive for cognitive reasons, an intrinsic incentive to which even younger students can relate. To quote one of the seventh graders in the present sample who, knowing the discovery experience first-hand stated, "I like to find different ways numbers can work together."

Inherent rewards, in this case mathematical discoveries, are usually experienced immediately (Rathunde, 1989), which is one reason why they are sometimes referred to as short-term. Cognitive rewards that are short-term include "mastering or using a skill involved in the activity" (Reuman, 1986, page 92), which is recognizable as task involvement (cf. Figure 2.1). Inasmuch as the rewards are inherent in the activity itself, short-term rewards are always intrinsic (Wong and Csikszentmihalyi, 1991). Longer-term rewards are associated with “the importance of the activity for some future goal” (Reuman, 1986, page 93).[5] From this perspective, intrinsic interest may be regarded as immediate to the act of discovery, not in some anticipated, future reward.

*Non-intellective Personal Rewards*

In the context of math, intrinsic rewards may be understood cognitively as short-term intellectual experiences, epiphanies of mathematical insight. Because of enjoyment, these rewards have non-intellective or affective meaning as well, as the words “personal aesthetic delight” clearly indicate. Short-term rewards, both cognitive and affective, help to explain the inherent enjoyment associated with long-term interest, a dimension that is generally missing in theories of autonomy and competence (Ryan, Connell, & Deci, 1985).

Oftentimes, students characterize the affective significance in terms of fun, as did one of the talent search participants: “[math] is fun and comes natural to me.” Enjoyment can be defined simply as fun (Middleton, Littlefield, & Lehrer, 1992), but there are several distinct, psychic-affective dimensions of enjoyment that should not be omitted in accounting for what draws people to challenging activities that are worth doing for their own sake. These dimensions, outlined by flow theory, help to clarify the affective meaning of optimal experiences and what individuals find interesting in them.

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5. The immediate reward has also been called the *intrinsic value* of the activity, as opposed to the longer-term *utility value* (MacIver, et al., 1991).

Flow, introduced in the preceding chapter, is a psychological construct derived from individuals' experiences with intrinsically rewarding activities. “Flow is what people feel when they enjoy what they are doing, when they would not want to do anything else” (Csikszentmihalyi & Nakamura, 1989, page 55). A key construct in terms of task involvement, intrinsic interest and effort attributions, flow helps to integrate cognitive and affective views of motivation in relation to specific activities.

## The Conjunction of Intellective and Non-intellective Meaning in Flow

Flow takes as its starting point the individual’s primal need to self-organize which results in greater order in consciousness and subjective pleasure (Csikszentmihalyi, 1988, 1990a, 1993; Simonton, 1988).[6] In cognitive theories, the needs for autonomy and competence are cast as the primary engines of motivation. From the perspective of flow, these engines, together with the need for increasingly higher levels of order share a common fuel: enjoyment.

At some point in development before the emergence of performance goals,[7] a young child experiences innate pleasure in order-finding, constructive activities. Encouragement by others at the successful completion of a task may help, but even without this an intrinsic satisfaction comes from an activity that results in greater personal

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6. It is believed by some that becoming increasingly organized is innate and necessary for survival, an instinct bestowed by generations of genetic programming (Csikszentmihalyi, 1993).

7. According to Nicholls (1984b), conceptions of ability are undifferentiated in five-year-olds; to judge their ability they refer to what they have accomplished rather than what others have accomplished. For the young child, a learning goal orientation is the norm, one sign that rewarding task experiences may be instrumental in the formation of mastery goals.

organization. Activities such as stacking blocks or talking help to satisfy the need for control, but as far as the youngster is concerned the activity is bound to be repeated because it was enjoyable. Why it was enjoyable is something she may have trouble expressing, but her interest does not depend on having a thought-out reason.

Similarly, even though years older, gifted students interviewed for the present study knew that math was fun but could give few reasons why. For them, solving problems was synonymous with enjoyment. They were largely unaware that mathematical solutions resulted in greater control or complexity in consciousness. But that did not matter; they liked making discoveries. It was greater knowledge and enjoyment they experienced; they found both to be interesting and because of both they came back for more.

## Elements of Flow

In light of flow, a number of pleasurable aspects of experience may occur without an individual knowing explicitly what they are. In fact, attending to them spoils the experience. However, when asked specifically to reflect on a flow experience, subjects' descriptions agree: the goals of the activity were clear and the feedback was immediate, skills were balanced with the demands of a challenging activity, concentration was effortless and fully devoted to the task, consequently, no thought was given to failure or the needs of the self, even the passage of time seemed to be altered (Csikszentmihalyi, 1975; 1990a, 1993, 1996). Each of these elements adds to enjoyment. Taken together, they comprise an optimal experience and are reasons why individuals seek more flow.

The enjoyment of flow is intrinsically interesting and a significant dimension of self-motivation. In the words of a climber that was once interviewed, “the purpose of the flow is to keep on flowing, not looking for a peak or utopia but staying in the flow. It is not a moving up but a continuous flowing; you move up to keep the flow going" (Csikszentmihalyi, 1990a, page 54). Even adults, who have a greater awareness why they seek out flow, do so to experience its pleasures. Their actions are propelled by a propensity for enjoyment. The enjoyment certainly involves feelings of personal control and competence, but not these alone.

Ultimately, the enjoyment of flow depends on perceptions and the right conditions. Considering the normal jumbled stream of consciousness experienced by adolescents and adults, gaining control of one’s thoughts is inherently enjoyable. As William James observed a century ago, “There is no such thing as voluntary attention sustained for more than a few seconds at a time” (1890, page 490). Problems from the past and worries about the future prey uncontrollably on the mind. Information that crosses consciousness conflicts with self-determined goals. So when individuals experience the focused, effortless thinking of flow, they tend to perceive it as pleasurable. Extended concentration becomes possible; information fits seamlessly with one's objectives. Thoughts are clear and actions seem to follow automatically even when the work is hard and challenging.

This state of deep concentration in which psychic energy (attention) is optimally focused is referred to as *psychic negentropy* (Csikszentmihalyi, 1988b). No additional attention is available for things other than the task that acts as the catalyst for greater order in consciousness. There is no perceptible psychic *entropy*. In effect, actions and awareness merge:

> When all a person's relevant skills are needed to cope with the challenges of a situation, that person's attention is completely absorbed by the activity. There is no excess psychic energy left over to process any information but what the activity offers. All the attention is concentrated on the relevant stimuli. (Csikszentmihalyi, 1990a, page 53)

Several salutary phenomena tend to coincide when attention is committed to this extent. One is that individuals lose track of time. Events seem to pass by quickly; hours may melt into what seem like minutes. Appointments may be overlooked; meal times may go unheeded. Part of the non-intellective enjoyment of flow seems to derive from being able to escape the inexorable passage of time, which tends to drag when it becomes the object of one's attention.

Normal distractions such as noise, hunger, and fatigue also tend to go unnoticed. Unwanted thoughts and vexations fade into the background. The psychic interference that is a regular part of work and leisure diminishes as all the available energy is consumed by the motivating activity (Csikszentmihalyi, 1988b). The assuagement brought about by negentropy is described as highly pleasurable.

Having no excess energy to concentrate on anything but the task, individuals in flow typically report a loss of self-consciousness. Prevalent worries about losing control or failing, which gobble up a good deal of mental energy, are replaced by a sense of potential control. Paradoxically, complete interaction with the task prevents the need for conscious control. Movements become automatic that normally must be deliberately controlled. The very thing which cognitive theories say motivates a person to engage in tasks becomes moot. Antithetical to ego involvement, one becomes unaware of the self. Even perceived competence which is felt to be critical in both ego- and task-involvement is temporarily set aside, possibly because flow satisfies the underlying need for control. Loss of self is often replaced with a sense of oneness with work, nature, or other participants, all of which are transcendent and highly enjoyable. According to Csikszentmihalyi (1990a), the elation is augmented by personal discovery: "When not preoccupied with our selves, we actually have a chance to expand the concept of who we are...to (feel) that the boundaries of our being have been pushed forward" (page 64).

The more of these dimensions that an individual experiences the greater the negentropy, and the more likely the goal of the activity is the experience itself (Csikszentmihalyi, 1988b). This experience, by definition, is intrinsic motivation for a task: "not a tangible object...but a direct experience, a state of consciousness that is so enjoyable as to be *autotelic* ('having its goal within itself')" (Csikszentmihalyi & Nakamura, 1989, page 52). In contrast to goal theory, a desire for the experience itself--not just mastery--is manifest in flow. Mastery is implicit: whether the activity is mathematics, climbing, music or virtually anything else, not only is it worth doing for its own sake, it sustains interest on its own and promotes engagement at successively higher levels (Csikszentmihalyi, Rathunde, & Whalen, 1993).

As the individual associates these pleasurable experiences with the activities that brought them about, greater personal interest is bound to result. The reward that individuals tend to seek during an optimal experience is negentropy, not autonomy or competence per se. However, without sufficient autonomy and perceived competence flow would not be possible because it tends only to occur at above average levels of skill (Csikszentmihalyi, 1990a).

Compared to cognitive theories, flow is unique in that one's motivational orientation depends predominantly on control of consciousness rather than exercising control over the surrounding environment.

In light of goal orientations, flow appears to be a special case of task-involvement that integrates perceptions of control and competence with several dimensions of affective pleasure. Like task-involvement, concerns about the ego or performance are de-activated. An obsessive ego orientation may obstruct flow if it prevents an individual from engaging in challenging enough activities. However, unlike task-involvement, it may be inconsequential whether success or failure is habitually attributed to one's effort or ability: neither attribution is a prerequisite for negentropy.

Figure 2.2 highlights the salient differences between flow, task-involvement and ego-involvement. Flow and task-involvement share an intrinsic task orientation, whereas an extrinsic orientation characterizes ego-involvement. A conceptual uniqueness of flow is that, unlike task-involvement, its opposite is not an extrinsic form of motivation. Instead, as more entropy offsets negentropy the potential enjoyment of the activity is increasingly negated. As a result, flow may be described as orthogonal to task-involvement, sharing a few of its characteristics but not others. Even though both may be considered task-intrinsic forms of motivation, the differences between flow and task-involvement become

**Figure 2.2 A Comparison of Flow, Task-involvement and Ego-involvement**

| *Comparison* | Flow experience | Task-involvement | Ego-involvement |
|---|---|---|---|
| **Motivational Orientation** | **Intrinsic** to task | **Intrinsic** to task | **Extrinsic to task** |
| **Opposite Constructs** | **Negentropy vs. Entropy** | **Task-involvement vs. Ego-involvement** | **Ego-involvement vs. Task-involvement** |
| **Success primarily attributed to** | **Negentropy** | **Effort** | **Ability** |
| **Primary source of pleasure or personal reward** | **Cognitive ease, Task enjoyment Discovery** | **Mastery, Discovery** | **Self-worth, Performance** |

more apparent in terms of personal attributions of success.

A person who is task-involved might say his success was due to trying hard; a person who experiences success through flow may have worked hard, but the work seemed effortless. In that case it is harder to credit one’s efforts. In flow the outcome just seems to happen, as author and physicist Freeman Dyson is reported to have said,

> I always find that when I am writing, it is really the fingers that are doing it and not the brain. Somehow the writing takes charge. And the same thing happens with equations. You don’t really think of what you are going to write. You just scribble, the equations lead the way.... (Csikszentmihalyi, 1996, pages 118-119)

Partly because actions that are normally challenging seem to follow automatically, the experience is perceived as pleasurable. In the present work this is referred to as *cognitive ease*: the efficiency with which challenging work is accomplished, work that otherwise without a deliberate effort would result in little headway. Presumably, persons who feel confident about their abilities will experience greater ease in performing tasks than those who lack confidence. Therefore, subjective competence is held to be a correlate of cognitive ease.

Also pleasurable are the products of the successfully-executed task. Presumably, insights, discoveries and inventions are pleasurable to all task-involved persons, including those in flow. But perhaps unique to flow is that the insight itself is not as enjoyable as the process by which the insight was obtained. People including the climber quoted earlier want to repeat the flow experience, not because it led them to greater heights, but because the experience getting there was so enjoyable. One also gets a sense of this in the following statement by an eminent yet unidentified research mathematician:

> Working on problems, having some insight, are the purest and strongest attraction. Research is where I really feel myself. Individual problems are great motivation. Still, I'm relaxed to a certain extent about the doing of mathematics, partly because I now really believe, which I didn't for many years, that there will be a next love affair, a next problem, a next excitement. (Gustin, 1987, page 109)

It is in the doing of the problems, not the end or long-term result, where the intrinsic interest lies. This is *task enjoyment:* the desire to keep the flow going, not wishing to be anywhere else or doing anything else, wanting to engage the task.[8] Cognitive ease and task enjoyment are two qualities of experience found in flow that are not addressed as such in other theories of intrinsic motivation. It is believed these qualities help further to explain why individuals find certain tasks inherently interesting.

## Situations for Flow

Before going on in the next chapter to describe the relationship between complexity and flow, this chapter concludes by describing three cardinal elements of flow that have been omitted from the discussion thus far. These elements are also conditions for flow: clear goals, immediate feedback and a balance at fairly high levels between a person's skills and the challenges of a task.

### *Clear Goals*

Not every situation will promote flow, but the chances of it happening are improved if certain conditions are met. Foremost is that the activity must provide clear goals (Csikszentmihalyi, 1988b, 1990a, 1993). To be optimally rewarding, an individual must be able to comprehend the goal of the activity. Clarity is made possible by the inherent legibility of the goal and a person's ability to decipher it. Activities such as games, sports and ritual events are ideally constructed for flow: they present clearly defined goals to those who participate in them (Csikszentmihalyi, 1988b). The ability to concentrate deeply is supported by the rules and limited stimulus field of the game, etc., which helps to minimize confusion. Moreover, these activities are typically structured in ways that allow them to be adjusted to the participant's level of skill.

While not exactly a game, sport or ritual, mathematics can present clear objectives and has a structure capable of being adapted to a person's abilities. If the structure is botched in the process, students' motivation may be lessened correspondingly (Usiskin, 1982). It goes without saying that an individual must be able to understand the objective or the structure of an activity if it is to be meaningful. A capable person will have difficulty making sense of an illegible or flawed goal. Faced with ambiguity, a person can invest a lot of psychic energy trying to sort things out, attempting to discern the purpose of an activity, often with false starts and few enjoyable results. Likewise, a perfectly clear goal or activity structure can be unintelligible to a person who does not possess sufficient ability to comprehend it. A deficit of intrinsic interest in math may be attributable to either condition and both are amendable.

### *Immediate Feedback*

Being able to derive immediate feedback from an activity is a second requisite for flow. The immediacy of feedback makes it possible to achieve complete task involvement (Csikszentmihalyi, 1990a, 1990b). Not to know how well one is doing in

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8. As the result of psychic negentropy, an individual may be expected to engage in a task to experience its positive affect again (Csikszentmihalyi, 1993).

relation to a specific goal can easily lead to a different task: trying to make sense of what one is doing, seeking ways to alleviate the confusion.

To this, cognitive research adds a dimension not usually addressed in flow theory: whether feedback is *informational* or *controlling* contributes significantly to its motivational function (Ryan, Connell, & Deci, 1985). An individual who perceives that the feedback is controlling (e.g., a teacher or parent who says, "you are doing as well as expected") will become less intrinsically motivated. In this regard, a person who is ego-oriented may be more sensitive to controlling feedback than one who is riveted on the task. Obviously, if a situation diverts one's attention to the dynamics of external control, flow becomes be less likely.

Informational feedback tends not to incite contests of control, that is, personal autonomy. Feedback that comes directly from interaction with a task tends to be both immediate and informational. To give a mathematical example, suppose $2x + 3 = 9$ is assigned as a seatwork problem. The student answers $x = 4$. Assuming the pupil understands the symbolic language and knows how to check the answer, upon checking the answer does not work. Nonetheless, the activity can proceed without delay; adequate information exists to guide the solution process. And assuming sufficient interest in doing the problem, the student will not stop here but will continue until it is solved, even though the initial feedback was negative.

The same situation could easily be turned into an opportunity for control by a teacher who states that 4 is not correct, and whoever fails to get the right answer will have to do the even problems as well as the odd problems in this section of the book. In any field, controlling feedback practically never comes from task engagement per se, but from the social structure in which the task is nested.[9] Even though controlling feedback does not have a positive effect on task interest, it can inspire a correct answer.

*A Balance between Task Challenge and Skills*

A third requirement for flow is a balance between the challenge of the work and one's ability. However, unless the challenge is significant, it will be boring or uninteresting. The difficulty of the work, if it is to be intrinsically motivating in terms of flow, may need slightly to exceed an individual's capacity (Csikszentmihalyi, 1993). Unless a person's skills are stretched, greater personal complexity may not follow. Therefore, elements of risk, failure and even negative feedback may inhere in work that is optimally challenging (Ryan, Connell, & Deci, 1985); although, if the work is disproportionately hard, one will experience anxiety or frustration (Massimini & Carli, 1988). In this respect, a person operating from a performance goal orientation may actually prefer tasks that are too easy, increasing the potential for boredom.

Between boredom and frustration is a window of optimal experience, where having too much or too little competent control is forgotten (Csikszentmihalyi, 1990a, 1990b, 1993). Optimal challenge and the need to demonstrate control constitute an antinomy: the experience of flow is impaired when a task can be controlled with certainty. Intrinsic motivation depends more on a sense of potential external control than the assurance of control, one of the few dissonances between flow and cognitive theory.

## Summary

As a phenomenological account of an individuals' task-related experiences, flow incorporates information about personal autonomy, perceptions of ability, self-awareness, attentional states, work efficiency, enjoyment, as well as goals, feedback and challenges encountered in specific tasks. Because of this, flow provides a more comprehensive view of intrinsic interest than theories which limit their scope to cognitive dimensions of experience. In relation to goal orientation theory, flow may be considered a special case of task-involvement. Whereas individuals who are task-involved are motivated primarily by mastery goals, to this flow adds a number of affective dimensions of enjoyment.

Although consensus on what makes a task interesting in itself may still be a good ways off, it is the author's position that the synthesis of cognitive and affective understandings of intrinsic motivation incorporated in flow marks a step in that direction. By examining the personal rewards that help to focus individuals' attention on tasks, new ground is gained on the dynamics of task interest. As described, these rewards may be experienced cognitively as well as affectively. Tasks tend to be more interesting when they provide opportunities for personal control and enable persons to feel more competent, but these traditionally cognitive reasons are not sufficient to explain interest. To these must be added the incentive value of discoveries which result in greater personal knowledge (hence, greater control and competence) and the experience of psychic negentropy that may accompany tasks (merging of action and awareness, loss of self-consciousness, and so on), both of which are cogent motivators. Inasmuch as task interest

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9. Other persons would not even have to be in the room to exert a controlling effect, for example,

may be defined in terms of individuals' attention, the elements of tasks that attract and hold their attention, that is, operate as inherent incentives, remain to be investigated.

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educational software designers.