

# Interest and Curiosity. The Role of Interest in a Theory of Exploratory Action

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Research into curiosity and exploration concerns itself primarily with describing and explaining exploratory behavior in terms of general laws. To do this, researchers typically rely on formal categories that allow the formulation of general statements independent of the particular goals or specific content of behavior and experience. This results, however, in the inadequate treatment, if not the complete exclusion, of important research questions. This applies, for example, to special cases of exploratory behavior as well as to the analysis of coherent sequences of exploratory actions. For instance, why would some individuals leave a situation that most people find stimulating, to seek out a situation that most people find rather dull (mineral collectors in a stretch of rocky desert)? Or how can we explain the tenacity and regularity with which individuals pursue certain forms of exploration involving great exertion and resulting in a gradual extension of competence?

Explanations based on everyday experience often incorporate the notion of an active individual pursuing particular content-related goals. The individual is not simply motivated, he or she is "interested" in some matter of content. Everyday-type theories regard the content-orientation and the intensity of interests as important factors for explaining curiosity and exploration. The current scientific discussion, on the other hand, neglects the concept of interest. This is true not only for curiosity and exploration research, but also for more recent research into motivation (Krapp, 1989, 1992a; Krapp, Renninger & Hidi, 1992). This is especially surprising in light of the fact that, as early as 1949, Berlyne, the founder of modern curiosity research, dealt extensively with the relation between interest, curiosity, and exploratory behavior, and, in a statement made shortly before his death, identified the object

of his scientific life's work with the words: "My interest is interest" (cited in Wohlwill, 1981, p. 7).

We believe that previous research into curiosity and exploration has overlooked and dealt inadequately with two related deficits: *firstly*, the inadequate treatment of the content and goals of exploratory behavior, and *secondly*, the inadequate treatment of content continuity in a coherent sequence of exploratory actions. In the following section, I attempt to show that this criticism applies equally to all of the theoretical approaches developed to date. Following this, I present the main ideas of a theoretical conception based on traditional views of interest-guided person-environment-engagements. In light of this conceptualization, I will then discuss why and how it could be useful to consider in more detail those aspects of exploratory behavior which traditionally have been essential components in a theory of interest and in our everyday thinking about interest.

## The Neglect of Content in Curiosity and Exploration Research

Three research perspectives have especially influenced the research conducted up to now, namely, the perspectives stemming from general psychology, differential psychology, and a theory of action.

### The Research Perspective of General Psychology

In interpreting curiosity, research approaches based on drive theories, theories of activation (Berlyne, 1960), or cognitive theories typically exhibit a general psychology perspective. Investigations center around phenomena that can be described and explained in terms of *general* laws of human behavior. Researchers are concerned first and foremost with the regularities or laws found to be equally valid for all individuals. Person-specific orientations, for example, content preferences within particular topic areas of curiosity, are ignored. Research into curiosity from a general psychology perspective also treats *changes* in exploratory behavior over time as a peripheral matter. It comes as no surprise, then, when the triggering conditions of exploratory behavior are assumed to lie in the stimulus properties of the situation (e.g., collative variables; cf. Berlyne).

## The Research Perspective of Differential Psychology

Within the tradition of differential psychology, regularities of exploratory behavior that can be observed for all individuals are of less interest. Instead, researchers focus on differences in behavior and on the explanation or prediction of interindividual differences in light of personality characteristics. Researchers typically have assumed motivational factors to be the source of these differences in the field of exploratory behavior.

Indeed, numerous catalogs and diagnostic methods for the description of various degrees of curiosity, in the sense of an exploration motive, have been developed. Typical examples would be the theories, conceptions and methods pertaining to "seeking curiosity" (Livson, 1967), "sensation seeking" (Zuckerman, 1979), "variation motivation" (Fischer & Wiedl, 1981; Pearson & Maddi, 1966), "quest for knowledge" (Krieger, 1976, 1981; Lehwald, 1985), "cognitive orientation" (Kreitler & Kreitler, 1976, 1981), or "experience-producing tendencies" (Henderson, 1989).

However, the theoretical concepts and methods which have been developed by differential psychologists also exhibit shortcomings. To the extent that these theories and concepts relate to stable dispositions that characterize a person over a longer period of time, they are forced to neglect the process aspect. Over the past few years, however, progress has been made toward the development of approaches that abandon a global conceptualization of curiosity in favor of process variables (e.g., Henderson & Moore, 1979; Kreitler & Kreitler, this volume). But even these models are not able to escape the criticism that research from a differential psychology perspective neglects the content dimension of exploratory behavior.

An exception to this can be found in Day's (1971, 1981) multidimensional model for the differential measurement of curiosity. Similar to Guilford's cube-model of intelligence, Day postulates three orthogonal dimensions of curiosity behavior: (a) the preferred source of stimulation, (b) the preferred type of exploratory activity, and (c) a person's *specific interests*. This last dimension borrows from Kuder's (1960) theory of career interests in relying on ten content-related topic areas. These ten areas, however, are defined in very general terms (e.g., outdoors, scientific, musical). Consequently, they are insensitive to the great variability of content-related interests as the trigger for or goal of exploratory behavior.

## The Theory of Action Research Perspective

A third research approach is based on a theory of action perspective. Research along these lines stresses typical human aspects, such as the conscious planning of a person-environment engagement. Actions represent organized sequences of ongoing behavior that correspond to "inner" cognitive processes and entities such as goals, values, and knowledge.

Within the context presented here, the goal-orientedness of an exploratory action is of special importance. "An exploratory action ... involves an active dealing with objects or events of the environment aimed at building up new structures of knowledge" (Voss & Keller, 1983, p. 159). At this point, the question arises as to *which* bits of knowledge are serving as the focus of the exploratory behavior. But this is a matter which this theoretical approach also fails to address. Instead, this research relies on a motivational tendency defined in purely formal terms. In accordance with Hunt (1961), researchers assume that experiences which induce cognitive conflict in a person represent a source of motivation for exploratory engagement.

One notes here again that nothing has been said about the content-orientation of exploratory behavior. This is somewhat disappointing, for if autonomous activity and conscious goal-orientation represent fundamental aspects of exploration, then an interpretation based upon a theory of action ought to say something about how individual value-orientations, interests or content-specific preferences influence exploratory behavior.

## Unsolved Problems in Curiosity and Exploration Research

Conceivably, this problem in traditional curiosity and exploration research has gone unrecognized or been largely ignored due to the fact that the majority of work in the field has been done with animals and young children. At this level of development the problem of autonomous goal selection plays no predominant role in activity. The preference for experimental designs involving standardized stimulus conditions and preselected exploration objects only reinforces this tendency (e.g., Hutt-Box; cf. Keller, Scholmerich, Miranda, & Gauda, 1987).

If, though, one considers the phenomena of curiosity and exploration as they occur outside the laboratory, then the problem of the content-orientation of exploratory activity increases in importance with increas-

ing willingness and ability to engage in autonomous behavior. A theory of exploration useful in describing everyday activity should, for instance, yield insight into whether and in what way specific exploration is influenced by the presence or absence of content preferences, or how such preferences determine stimulus-search behavior in the case of (diversive) exploration. I refer to this gap in exploration research as *inadequate analysis of the content aspect of exploratory behavior*.

A further deficit appears when exploratory behavior is regarded not as a one-time act, but rather as a series of actions undertaken in relation to one another. Indeed, the sum of all individual actions results not in some random pattern, but in a structure having subjective meaning. Individual actions can relate to one another in a number of ways. For instance, there are sequences of activity that relate to analogous objects or that pursue comparable content-related goals. In light of the cognitive effects of exploratory activity, the sequence involved in a topically structured series of actions merits special attention. For what comes to mind sooner than the idea that long-term preferences for objects, possibilities of action, and topics (in other words "interests" in the original sense of the word) exert a fundamental influence on both the orientation and nature of individual exploratory actions, and in doing so determine the very nature of "cognitive construction" as well?

This matter becomes of even greater importance when sequences of exploration, arranged along topical lines, are viewed from an ontogenetic perspective. Doing this brings into focus problems that have been largely ignored up to now, such as the development of exploratory styles as a function of object domain preferences, or the effects of content-specific explorations on the type of cognitive construction within the person. This brings into view a second group of questions and unsolved problems. These questions and problems arise in conjunction with the (all too long neglected) aspect of continuity of goals and content in exploratory behavior. This, too, represents a great deficit in traditional exploration research. In what follows, I refer to this deficit as *inadequate analysis of content continuity*.

In the following, I attempt to show that conceptualizations originating in a theory of interest can aid us in the theoretical and empirical treatment of these two problems. First, I outline a concept of interest, in which interest is regarded as a specific kind of "person-object-relationship" (Fink, 1991; Krapp, 1992b, 1993; Krapp & Fink, 1992; Prenzel, 1988). Following this, I introduce a few examples to show how this concept of interest can be used to clarify the content aspect of exploratory behavior.

## A Concept of Object-specific Interests

The conceptualization of interest presented here is based on theoretical consideration of the origin and effect of person-environment relationships. It is assumed that individual development is determined largely by the quality and course of a person's relationship to the social and physical environment. Continual interaction with people, objects, events, and areas of subject matter (content) leaves behind traces in both the person and the environment. Each experience adds to and differentiates a person's store of knowledge. The person acquires cognitive representations about the "nature of things" (declarative knowledge) and about action possibilities (procedural knowledge). Person-environment engagements thereby shape a person's cognitive and motivational structure. This includes the development of values, attitudes, motivational orientations, and other components closely associated with cognitive processes.

In the course of an individual's development, experiences are organized into categories and classes of categories, which are themselves subject to reorganization depending on their meaningfulness to the person. Thus, each person builds unique, subjective cognitive structures. But different individuals also acquire very similar cognitive structures simply because similar realities and interpretations occur within the cultural context. The cognitive categories and structures reflecting these aspects of the environment are objective in the sense that they are the same across individuals which are members of a social system.

It seems safe to assume that individual categories vary in subjective importance across different situations and phases of development. In the course of development the person develops a special relationship to certain parts of the environment. An individual interest is a unique relationship between a person and an object, or object domain, found in that person's environment. This relationship must be of some duration, and does not refer to one-time, unrepeated forms of engagement<sup>1</sup>.

<sup>1</sup>Person-object-relationships may be analyzed in terms of both process and structure. These represent two theoretical perspectives, and are associated with two levels of analysis. The first level of analysis deals with the internal and external interest-oriented actions related to an object. At this level, interest is understood as a state that represents the actualized relationship between a person and an object in a specific situation at a certain time. The second level of analysis interprets interest as a persisting disposition. As a dispositional category, interest may manifest itself in subjective representations that are value-related and cognitive in nature.

A more precise theoretical description of this interest-concept centers around three aspects: (a) the object of interest, (b) the structural components of interest, and (c) the characteristics of the interest-oriented person-object-relationship.

## Interest Object

Three conceptual levels of objects are distinguished: object domains, objects of interest, and reference objects. The levels differ from one another in their degree of specificity. The most general level involves *domains of interest*, such as "music", "sports", or "travel". School content areas, such as math, biology, or history are also interest domains.

At the next level are *interest objects*, also referred to as "objects of interest". An interest object consists of that part of an entire interest domain which a particular person at a particular time includes as a personal interest. Objects of interest are person-specific. Although two different people may enjoy the same things and action possibilities with a certain domain, and therefore have very similar interest objects, each individual will have had some unique experiences, thus excluding the possibility of their interest objects being identical. Someone who is interested in "sports", for instance, is very unlikely to be interested in or even aware of every aspect of every sport on earth. Rather, one person might be interested in performing non-team sports that require good physical condition (marathon running, cross country skiing), whereas another person might be interested in watching professional team sports.

Finally, the third level involves the particular, concrete things used when engaging in activity with the object of interest. These are referred to as *reference objects*. Going back to the above examples, a person interested in non-team sports might have running shoes, and a stopwatch as pertinent reference objects, whereas someone interested in watching professional team sports might have binoculars, season tickets, and subscriptions to sports magazines. It should be noted that reference objects are not the only elements found in a person's interest object.

It is important to clarify some further matters relating to these interest objects. Firstly, objects of interest are based on more than just concrete reference objects. Abstract or ideal elements, for example, symbolic representations of things, concepts, and events, information,

and questions of a scientific nature can all be part of an object of interest. Secondly, insofar as they function as interaction partners, people are not regarded as objects of interest. Thirdly, even though one and the same domain can be involved in the formation of completely different person-object-relationships in different people, these different relationships can all be described and explained in a consistent manner on the bases of general rules.

### Structural Components of the Interest-Oriented Person-Object-Relationship

Each interest has a more or less differentiated structure. The complexity of the structure can be modified by eliminating elements (substructures, components), by adding elements, or by processes of incorporation and exclusion (see Fink, this volume). Simple as well as complex person-object-relationships can be broken down into individual components. These basic structural components include reference objects, activities (i.e., action possibilities), and topics.

**Reference objects.** Concrete objects (reference objects) are essential elements for most person-object-relationships, for example, books for the object domain "literature"; or instruments, sheet music, or records for the object domain "music". In empirical studies, reference objects serve as landmarks for charting the boundaries and content of subjective domain perception. In many cases, they represent the primary content of an interest (e.g., collecting of certain things). Furthermore, the objective characteristics of an interest object often have a direct influence on a person's engagement with it. For example, an engagement may be limited by the material characteristics or the socio-culturally determined purpose of the interest object (e.g., artistic work that involves valuable materials).

**Activities.** A second structural component is the type of activity associated with the object of interest. Such activities include not only observing, perceiving, manipulating, and exploring the different characteristics of an object, but also changing the object or making the imagined object real (e.g., when a child paints or builds something that he or she thought of earlier). A further important activity is acquiring and processing information about the object or activities associated with it (e.g., searching

for relevant sources of information). Social contacts also are frequently included within object-related activities, particularly when the person-object-relationship can be realized only within a group (e.g., games involving social interaction).

**Topics.** The present and future forms of activity that a person undertakes with an object depend, in large part, on a person's goals, topics, and questions regarding the object (Renninger, 1989, 1990). Topical categories often serve to guide interest-oriented engagement and thereby influence the specific course of events involved in an activity as well as its overall nature. A teenager's interest in computers will exhibit a completely different structure for activity with a prepackaged computer game than for activity with a home-made toy robot, even though the interest involves the same reference objects (e.g., hardware, programs) and competence (programming).

#### Special Characteristics of an Interest-Oriented Person-Object Relationship

Although the basic structural components of an interest-oriented person-object-relationship are important landmarks for the empirical reconstruction of an interest, they give only an incomplete and approximate picture of the theoretical construct. A more detailed picture emerges from investigation of the special theoretical characteristics of an interest-oriented person-object-relationship. These characteristics include: selective persistence, value orientation (self-intentionality), positive emotionality, and differential cognitive representation.

**Selective persistence.** The term "persistence" means that interest-oriented action is not a one-time or short-term affair. Rather, it is characterized by a certain amount of stability. Strong individual interest elicits repeated engagements with the object. Thus, a child's fleeting, curious attention toward an object in the environment cannot be classified as interest. Usually it is not difficult to recognize different degrees of persistence in intraindividual comparison of actions with respect to particular objects and topics (Renninger & Leckrone, 1991). In empirical investigations the degree of persistence may be operationalized as the *frequency* of engagement within a particular object domain. A more precise analysis might compare the frequency of actual person-object-

engagement in a particular domain with the frequency of possible opportunities for engagement in that domain. Within a single incident of interest-based activity, the *duration* of engagement can serve as an indicator of persistence.

Defining persistence as repeated engagement with an object and individual willingness for long-term involvement with that object implies choices. From an array of action possibilities and objects, an individual must choose those which best match his or her interests. Thus, persistence of person-object-relationships develops only through a *selective* process (Prenzel, 1988, 1992).

***Value orientation and self-intentionality.*** Objects, activities, and topics associated with an interest are experienced as important and meaningful because they are closely related to personal attitudes and values. Linking personal interests to values and attitudes is common to older and more recent theories of interest (e.g., Dewey, 1913; Hidi & Baird, 1986, 1988; Kerschensteiner, 1926; Lunk, 1927; Rathunde, 1992; Renninger, 1989, 1990; Renninger & Wozniak, 1985). This does not mean that a person is necessarily aware of personal value judgements, or that a reflective judgement is made prior to interest-based activity. But, greater personal maturity and increased differentiation in a person's set of values will increase the likelihood of the person developing interests on the basis of conscious value judgements.

The value orientation of interest can surface in diluted form, as a *preference* for particular objects, activities, and topics (see Fink, this volume). Empirically useful indicators of preference include relative desirability of the object in the eye of the individual, time spent with the object, and choice in favor of interest-relevant activities.

Another important characteristic of full-fledged interest is *self-intentionality*. This is somewhat comparable to both Csikszentmihalyi's (1975) "autotelic" behavior (which is based on Biihler's [1918] concept of "Funktionslust") and Deci's (1980) intrinsic motivation, both of which refer to activities that are conducted in the absence of external stimulation (e.g., sanctions or reinforcement), and thus are under subjective internal control (Deci & Ryan, 1985, 1991). One can speak of an activity as self-intentional only when the person can independently plan it

and carry it out. Hence, the principle of self-determination must be involved in interest (Deci, 1992; Krapp, 1992b, 1993; Van der Wilk, 1991)<sup>2</sup>.

**Positive emotions.** Interest-oriented engagement with an object is usually accompanied by positive or pleasant feelings. In extreme cases, the positive emotions that accompany activity can intensify to the point of total immersion in that activity. This results in a "flow" experience, as described by Csikszentmihalyi (1975,1990). But positive emotion is a global evaluation, which certainly cannot describe every aspect of an interest-oriented activity. During the course of such engagement, some negative feelings, such as anger and discouragement, may also occur. However, the emotional balance is presumed to be positive when the activity is considered as a whole (Prenzel, Krapp, & Schiefele, 1986).

**Cognitive aspects.** Repeated engagement with an object of interest results in specific cognitive structures (Renninger, 1989, 1990). An individual tends to develop relatively differentiated knowledge about an object of interest. This includes knowledge about the object and knowledge about action possibilities (procedural knowledge). Action-oriented knowledge relates both to previous concrete experiences, and to object-based activities (experiences) that the person has not yet attempted but has learned about from watching others, or from other information sources (Prenzel, 1988, 1992). In its developed form, then, interest is characterized by a high level of object-specific cognitive complexity.

As Piaget (1974, 1981) suggested, a person working in a domain of interest is exceptionally willing to assimilate that which is experienced and to accommodate his or her thinking accordingly. The use of available schemata to set goals, make sense of experience, and store new information in memory (assimilation), as well as the modification of schemata and the resulting extended competence (accommodation), are based on interest to a great extent. Piaget (1974, p. 131) even goes so far as to say, "Every intelligent activity is founded upon an interest."

<sup>2</sup>Self-determination distinguishes the present view of interest from instrumental action models of motivation (cf. Heckhausen, 1980), which define the motivational basis of an action as a process of rational calculation. These theories presuppose that a person chooses activities on the basis of the perceived likelihood of desirable or undesirable outcomes. However, consideration of long-term "pay-offs" actually plays a subordinate role in actions guided by interest. Rather, participation itself and the immediate outcomes are considered to be sufficient reasons for performing the action.

## Interest and Exploration

Of what significance are interests for exploratory activity, and how can the concept of object-specific interest be applied to the two problems mentioned above, namely the problems of inadequate analysis of content specificity and of content continuity in exploratory activity? This section attempts to answer these questions by presenting hypotheses about the influence of interests on exploratory behavior, along with the available empirical findings relating to these hypotheses. It will be seen that interests play an important role in both diversive and specific curiosity.

### Interests Determine the Content and Direction of Diversive Exploration

Diversive exploration commonly occurs when a person has ended his or her specific exploration of an object and either begins to play around with the object or turns to a new object. In this stage, the choice of objects, actions, or topics for activity may appear rather arbitrary, seemingly dependent on the stimulus conditions of the situation. But experimental findings do not give a complete picture of this phenomenon, as methodological considerations often require a purposeful limiting of the action possibilities made available to study subjects. This limitation does not allow for a very common, everyday phenomenon, namely the purposeful, consciously controlled search for a subjectively preferred object or action possibility.

Our observations of kindergarten children, made during a study of interest development in natural settings (interest genesis project; cf. Fink, in this volume), revealed that, following a stressful situation, children often seek out play activities involving familiar objects in their areas of interest (Fink, 1991; Krapp & Fink, 1992).

*Example:* Michael was a loner in the kindergarten group. Coming from a modest background, he found it difficult to assimilate to the social group, and to participate in games with his peers in the way to which they were accustomed. Whenever these situations became too much of a strain for him, Michael turned away and sought out familiar toys that, as shown by our reconstructions, belonged to his most preferred person-object-relationship. This observation could also be interpreted to

mean that Michael, in a state of diversive curiosity, tended to occupy himself within the framework of his personal interests.

Observations like this support the hypothesis that the motivational state of diversive curiosity must be viewed separately from a content-neutral willingness to engage in activity. Not even small children limit their play behavior to the opportunities and stimulus qualities of the objects that happen to lie within the immediate field of perception. Instead, they often conduct a purposeful search for favorite objects or play opportunities. The more an individual is able to recognize the alternatives that are available and to determine his or her activities, the greater will be the role of interests in shaping behavior in such situations. Studies involving adolescents and adults confirm that persons having a pronounced preference for certain object domains will very probably engage in activity with objects from those areas if the situation permits free selection of activity (Hoff, 1986; Schiefele & Krapp, 1991).

### Interests Influence the Goal Orientation of Specific Curiosity and Exploration

From a theory of interest perspective, interest-oriented action is closely related to specific exploration. In both instances, a person examines portions of the environment in a goal-oriented and self-determined manner, in order to gain understanding and to eliminate cognitive uncertainty. In so doing, the person develops new knowledge, and changes his or her cognitive structure. Different approaches have been taken in the attempt to explain this form of behavior. Traditional curiosity theories emphasize stimulus aspects (collative variables). To the extent that personal motivational factors are considered, content-neutral explanatory factors occupy center stage, for example, cognitive incongruence (Hunt, 1963, 1965) or feelings of efficacy (White, 1959). Interest concepts, on the other hand, focus on matters of content. These concepts ascribe repeated and intensive engagement with topics or objects to personal preference. Most forms of specific exploration are integrated into complex action sequences and allow for great flexibility in selecting the aspects to be investigated or in focusing a single exploratory action on a small portion of the entire range of possible activities. On the surface, such decisions may seem quite arbitrary. We suspect, however, that such content selection does not occur randomly, but rather is the result of previous experience, and of topic or object preferences. Although our

research has yielded no definitive empirical proof of this, observations do support this hypothesis (cf. Fink, 1991).

*Example:* Over the course of the kindergarten study mentioned above, one child (Daniel) exhibited an especially noticeable interest in the object domain "animals". Whenever the opportunity to relate an activity to some area of content presented itself, for example, in role playing, crafts, or painting, Daniel related the activity to animals. This was also true of situations containing opportunities for specific exploration, for example, looking at books, or observing the surroundings while on field trips.

### Interests Influence the Design of an Exploratory Action

All other things being equal, an exploratory act undertaken out of interest will involve a different course of events than an exploratory act triggered by other factors. This involves characteristics such as persistence (endurance), and the variability of forms of engagement.

Renninger (1990), whose theoretical conception of interest is similar to the person-object-conceptualization used here, investigated the effects of interest on the quantity and quality of play activity of children between the ages of 2;9 and 4;2 years. Albeit using a different terminology, she also analyzed diversive and specific forms of engagement involving play objects. Her findings suggest a powerful and consistent effect of interest on children's play actions involving exploratory activities. The children played with identified objects of interest for longer periods of time than with identified objects of noninterest. This suggests that the children may have seen more possibilities for action with identified objects of interest, and may have been setting challenges for themselves which vary from those they set for themselves with identified objects of noninterest.

### Interests Serve as the Basis of Content Continuity in a Sequence of Exploratory Actions

As mentioned earlier, persistence is a fundamental characteristic of interest (Renninger & Leckrone, 1991). The repeated engagement and the willingness for long-term involvement with an object implies selec-

tive choices. From an array of possible actions and objects, an individual must choose those actions and objects which best match his or her interests. If one assumes that interests are often at the root and determine the content of freely selected forms of exploratory behavior, then it becomes impossible to regard exploratory actions inspired by interest as single, isolated phenomena. The goals of single actions, the nature of exploratory activities, expectations in terms of emotional and cognitive effects, and other aspects as well can be interpreted satisfactorily only by viewing the single action as an element in a coherent sequence of activity.

Our studies pertaining to the development of interests have shown that the preference structure of a particular interest can contain diverse possibilities for concrete realization in terms of both objects and activities (cf. Fink, 1991, p. 194).

**Figure 1:** The preference-structure of a topicspecific interest

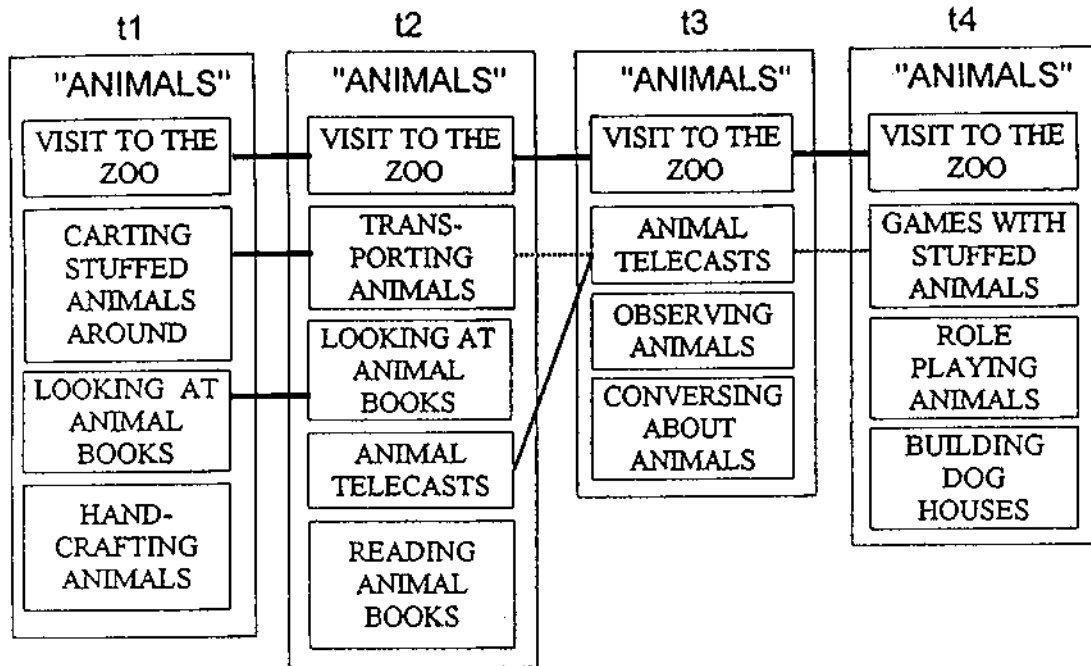


Figure 1 portrays the preference structure of a four-year-old child, who is interested in the topic "animals" and who, as a result of this interest, brings together a wide assortment of activities under the roof of this common topic. The markings extending from t1 to t4 refer to the four phases of data collection at the beginning of each kindergarten year. Even at this relatively general level of reconstructing a person's interest structure over the course of time, one can see that the internal structure of an interest can contain components that at first glance seem completely unrelated but which are in fact connected to one another, for example, looking at books (t1,t2), watching TV (t3) or building houses (t4). An absolutely rational connection can exist between different exploratory actions and objects that, to the adult, appear to be nothing more than randomly selected play objects and activities.

It seems significant that, over the course of time, a combination of highly preferred activities has developed out of repeated engagements with certain objects and topics, and that these engagements were, in many cases, coupled with exploratory actions. Any new exploratory action that the child undertakes exists and acquires meaning within this greater context. The orientation of exploratory acts, as well as the topic that the child selects for the next action during the course of an "exploration unit" will, to a certain extent, depend on the logical consequences of previous explorations.

### Interests Determine the Nature and Orientation of Cognitive Construction

Extending this train of thought, and considering especially the long-term effects of explorations, one arrives back at the aspect of cognitive construction. Our study results reveal considerable individual differences in exploratory behavior involving novel objects and considerable differences in willingness to acquire more knowledge about the objects. In order to explain these interindividual differences, Voss (1981) hypothesized a "rate of cognitive construction" that differs from person to person. This explanation assumes a general trait-like disposition towards more demanding or less demanding forms of exploratory behavior, independent of the nature of the object and the content to be explored.

Viewing the situation from the perspective of a theory of interest leads to a simpler and probably more adequate explanation: In most situations, interest is the primary determinant of whether or not a cer-

tain object is even considered for exploratory activity, and of the extent to which the exploration is carried out. In this sense, the preferred "rate of cognitive construction" will vary with the situation and will fluctuate as a function of the presence or absence of interest.

Interests also influence the orientation of cognitive construction. The areas in which a person chooses to learn more, or, in other words, where discrepancies between the cognitive structures already available and the complexity of the "object structure" found in the object itself are sought out, discovered, and resolved, will depend to a great extent on a person's previous experiences, on the store of knowledge that is already available in the wake of previous engagements with the object, and last but not least on the wish for completeness in the knowledge structure pertaining to particular objects (Krapp, 1992b, 1993).

The following example may illustrate this point. Imagine two groups of teenagers who have the opportunity to explore a new computer system containing a large and varied assortment of computer software. The two groups have been told to take as long as they like to explore the new computer system. The first group is made up of teenagers who have developed highly differentiated personal interests in working with computers. The other group is made up of teenagers who, in the course of their schooling, have also learned how a computer works and how it can be used in certain situations, but who are not particularly interested in computers per se. Under otherwise identical conditions, the exploratory behavior seen in the two groups will be entirely different. One would expect to find, for instance, that the extent and duration of exploratory behavior are markedly more pronounced in the first group than in the second group. In addition, a greater variety in both the orientation and quality of exploratory behavior would be expected in the first group. For each of the teenagers in this first group would be likely to explore the possibilities offered by the new machine and to try out action possibilities in those areas where his or her special interests and abilities lie.

Numerous studies have explored the effect of interest-guided action on resulting knowledge structures (cf. Hidi, 1990; Krapp, 1992a; Krapp & Prenzel, 1992; Renninger, Hidi, & Krapp, 1992; Schiefele, 1992). Our own studies have shown that topic interest considerably affects the cognitive engagement with relevant text content when reading, and hence exerts considerable influence on knowledge representation. The knowledge structures acquired by high-interest subjects differ especially in *qualitative terms* from those acquired by low-interest subjects. The object-specific knowledge of high-interest subjects exhibits more depth,

96 CHAPTER 11 is based more firmly in the central concepts and relations presented in the text, and is, as a result, more useful when discussing principal problems or when attempting to transfer knowledge to a new situation (Hidi, 1990; Krapp, Renninger & Hidi, 1992; Schiefele 1991; Schiefele & Krapp, 1991).

## Summary and Conclusion

Previous research into curiosity and exploration has largely ignored two problems: the analysis of both content specificity and content continuity in exploratory behavior. This article suggests that an object-related theory of interest offers a plausible basis for the description and explanation of the content aspect of exploratory behavior. Our thinking in this direction centers around what we call the person-object-theory of interest.

Interests, insofar as they represent a stable relationship between a person and an object domain in that person's environment, provide us with a possible explanation of the content dimension in diversive exploration. We believe that diversive curiosity and exploration are not directed randomly at whatever objects or action possibilities happen to be available, but instead often exhibit a goal-oriented character. According to this view, interests are an important component of this phase of stimulus-search behavior.

Interests also play a decisive role in the content orientation of specific curiosity. Findings from studies involving adults as well as children lead to the conclusion that engagement with an object in which a person is greatly interested proceeds in different fashion and exhibits a different qualitative character than does engagement with an object in which a person has little or no interest. Interests influence the goal-orientation, the course of events, and the result of single exploratory actions.

In addition, interests also influence the content and effects of a chain of exploratory actions separated from one another in terms of time or situation. Interest serves as the basis of the content continuity found in a sequence of exploratory actions. This content continuity especially affects cognitive construction. We believe that personal interests determine both the "rate of cognitive construction" and the quality and direction of the modifications associated with this construction.

This hypothetical position takes on a new dimension when one adopts an ontogenetic perspective in considering continuity of interest content over a longer sequence of exploratory actions. One can well assume, for

instance, that during the course of development a close relationship exists between exploratory and interest-oriented behavior. For one thing, the ontogenetic changes in the overall structure of all a person's interests must have some effect on the content and form of a person's exploratory behavior. On the other hand, it seems reasonable to assume that general exploratory tendencies, which at the beginning of development have no specific content, influence either directly or indirectly the development of interests. Experiences of success or failure while exploring unfamiliar objects and other related psychic phenomena play an important role in the origin and change of object-specific preferences.

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