

Curiosity

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Abstract:

Concepts related to interest, curiosity, and learning motivation appear in a wide swath of scholarship. This chapter develops a perspective on curiosity that is grounded in modern models of motivation and emotion. A functional approach seeks to understand human curiosity in terms of the functions it serves for near-term adaptation and long-term human development. I suggest that curiosity serves three related functions: (1) it motivates people to learn for its own sake; (2) it serves as a counterweight to anxiety, which motivates avoiding new things; and (3) it serves as a counterweight to enjoyment, which motivates sticking with tried-and-true sources of reward. The chapter ends by considering some definitional issues (such as whether “interest” and “curiosity” are different states), exploring relationships between curiosity and other emotional states (e.g., surprise, confusion, and awe), and examining individual differences related to curiosity.

Keywords: Curiosity | Interest | Motivation | Knowledge seeking | Competence | Functionalism | Awe

Article:

If anything defines the human condition, it is our ability to immerse ourselves in inane and nonsensical things. Unlike other animals, we can be motivated to spend our energy and hours on the hopelessly impractical things that will never put money in our wallets, food in our tummies, or mates in our beds. Much of what we do and learn is practical, of course, but unlike almost all other animals, people can transcend daily life’s practical problems when investing their time and brainpower.

As the history of research on human motivation shows (Bolles, 1967; Silvia, 2012), scientists have grappled with the family of concepts captured by *curiosity* since psychology’s early days. In modern times, concepts related to interest, curiosity, and learning motivation appear in a wide swath of scholarship, from genetics to classroom instruction to literary analysis (Silvia, 2006). In this chapter, I step back to look at the bigger picture of curiosity. My aim is not to review or integrate such disparate fields. Instead, I want to discuss a perspective on curiosity that is grounded in modern models of motivation and emotion. These models do not solve all the problems that human curiosity poses, but they do try to analyze curiosity at a fundamental and

general level instead of within a narrow domain (e.g., vocational decisions or classroom learning).

After considering how the modern science of motivation and emotion views curiosity, we will consider some of its implications. Some definitional issues that have bedeviled research on interest and curiosity, for example, can be clarified by a basic analysis of how curiosity works. Likewise, the thorny nature of individual differences in interest and curiosity can be unpacked and illuminated.

Why Are People so Curious? A Functional Analysis

Why are humans curious at all? Plenty of the world's creatures seem wholly incurious: they eat, sleep, and mate. Many animals, particularly mammals, show behavioral expressions of curiosity that we humans recognize (e.g., Darwin, 1872/1998), such as experimenting with objects, exploring new places and things, and playing. But all of us animals are the product of a long evolutionary process, so the distribution of curiosity as a motivational system across species must tell us something fundamental about it.

This is the starting point of a *functional approach*, which seeks to understand human curiosity in terms of the functions it serves for near-term adaptation and long-term human development (Keltner & Gross, 1999; Parrott, 2001). My ideas about the functions of curiosity are heavily influenced by Izard's (1977) model of human emotions, which views emotions as evolved psychobiological systems that have adaptive roles in human development. His functional view is widespread in modern emotion science. Most modern theories view emotions as having motivational qualities that organize behaviors necessary to confront humans' major adaptational challenges (Frijda, 1986; Lazarus, 1991; Panksepp, 1998; Scherer, 2001; Tomkins, 1962).

Curiosity, in Izard's view, is captured by the basic emotion of *interest–excitement*. (Curiosity and interest are essentially synonymous in this model.) Like all the basic emotions, interest is innate, in the sense of being unlearned and universal—people are not taught to be curious. And like all emotions, interest accomplishes something for people. Some emotions have obvious functions, such as fear's preparation for fighting or fleeing, but others have more subtle functions that reflect long-range social or developmental goals (Abe & Izard, 1999). Interest's functions are both obvious and subtle, and they can be viewed as a family of intertwined functions.

Function 1: Interest Motivates Learning

Some species have little need for learning: many animals, from seahorses to salamanders, are born more or less ready for the challenges they will face in their environments. Being born ready has its virtues, but the trade-off is behavioral rigidity. Such creatures are behaviorally inflexible, and their limited ability to learn prevents them from capitalizing on acquired experience. On the other hand, other creatures, such as humans, are born ignorant but with an awe-inspiring ability to learn. Here we see the other side of the trade-off. Humans are born helpless and incompetent, and we remain dependent on adults for an unusually long developmental period. But our ability to learn allows us to capitalize on experience, act flexibly, and leverage cultural knowledge passed along from adults.

The emotion of interest, in Izard's view, is an engine of learning. Curiosity is what gives us our hungry minds. It is the motivational system that ensures that humans will engage with the environment, enjoy learning, and seek out new experiences and ideas (Abe & Izard, 1999). If they have a system that motivates learning for its own sake, people do not need to be born with much innate knowledge—they will inevitably want to learn because they are easily bored and will enjoy exploring new things.

It is telling that the emotion of interest appears so early in development. Developmental research on emotion shows that, across the globe, emotions appear in a fixed order during infancy (Izard, 1978). At birth, newborns show—as all parents know—an eerily effective distress system. But they also show a nascent form of disgust (e.g., rejecting bad-tasting objects from the mouth) and a well-developed form of interest. At birth, infants show selective attention, both to human faces (aiding social bonding and social learning) and to events that are novel and changing. From the beginning, the human baby's mind is hungry.

Across the lifespan, our curious minds motivate us to learn. The allure of the new, the vexation of boredom, and the desire to learn foster long-term developmental projects, such as acquiring complex skills and mastering large bodies of knowledge (Fiske & Maddi, 1961). Without the intrinsic motivation to explore inherent in curiosity, it would be hard to acquire the complex competencies that adults have .

Function 2: Interest Serves as a Motivational Counterweight to Anxiety

The emotion of fear serves the noble goal of keeping us safe by promoting caution and wariness (Lazarus, 1991). It is not irrational to fear new foods, new places, new things, and new people. New things can be, and quite often are, harmful to us. Feelings of fear thus motivate avoidance: anxious people do not approach, seek out, or engage with unfamiliar things. But what would happen if we always avoided unfamiliar things? New foods, new places, new things, and new people can be fascinating and rewarding, so our wariness would make us miss out.

Motivation science has a long history of emphasizing push–pull conflicts between motivational states (Atkinson, 1964; Bolles, 1967). The tension between anxiety and curiosity is a classic case, one emphasized by most of the theories of curiosity that come from motivation science (e.g., Berlyne, 1960, 1971; Kashdan, 2004, 2009; Spielberger & Starr, 1994; Tomkins, 1962). Avoiding new things keeps us safe, but it prevents us from cultivating knowledge and expertise: we cannot learn new things without trying new things. Conversely, curiosity motivates us to explore new things, but it exposes us to their real risks.

One of the functions of interest, then, is to serve as a counterweight to anxiety. Because new things can be scary, the motivational system needs an appetitive, approach-oriented mechanism for overcoming wariness and making new things appealing.

Function 3: Interest Serves as a Motivational Counterweight to Enjoyment

Fear of the unfamiliar is not the only barrier to exploring new things. Attachments to the familiar are a less obvious but probably stronger barrier to engaging with novelty. The emotion of happiness does many things (Fredrickson, 1998), but a key function is to build attachments to people and things that evoke it (Tomkins, 1962). When an activity is enjoyable, people develop positive attitudes toward it and expect that doing it again will evoke similar happy feelings. A tension thus exists between trying something new and trying something that has always been fun.

The motivational conflict between interest and enjoyment is fascinating. It has been discussed by several emotion theories (Izard, 1977; Tomkins, 1962), but it is counterintuitive and has not received much attention in the study of curiosity and interest (Turner & Silvia, 2006). Happiness motivates people to stick with the sure bet, to go with what was safe and fun and rewarding the last time. Interest, in contrast, motivates people to go out on a limb, to try something new.

One way to see the conflict between interest and enjoyment is to expose people to creepy and unseemly things. In one of our studies (Turner & Silvia, 2006), we asked the participants to view a broad set of Western paintings. Some of the images were familiar and calming, such as nature landscapes or impressionistic art. Other images, however, were disturbing, creepy, or upsetting (e.g., Francisco Goya's *Saturn Devouring His Children* and Francis Bacon's *Head Surrounded by Sides of Beef*). For each painting, people rated their feelings of interest and enjoyment as well as ratings of the images' familiarity, novelty, and disturbingness. Overall, interest and enjoyment were unrelated. Appraising images as new and unfamiliar predicted higher interest but lower enjoyment—unfamiliar things were interesting but not pleasant. Likewise, the disturbing images were much more interesting—but much less pleasant—than the conventional ones. Thus, while interest and enjoyment commonly go together, they represent different emotions with distinct functions.

The tug of the familiar versus the allure of the new appears whenever people have to choose between what they like and what they not yet tried. When people want to go out to eat, do they go to their favorite place that they always enjoy, or do they try the new place that just opened next door? The new place might be better, so trying something new could uncover a new source of reward. But it might be disappointing or foul, so trying something new has a big opportunity cost when there is a sure thing. Even when people choose their favorite restaurant, do they pick what they always pick, or do they try something new?

As a pair, fear and enjoyment are major barriers to trying new things. Fear motivates wariness and avoidance of unfamiliar things; happiness motivates attachments to tried-and-true sources of pleasure. Curiosity thus motivates people to engage in new things despite both the potential cost of the action (i.e., it could be harmful) and the opportunity cost of forsaking the sure thing.

Curiosity's Conceptual Cousins

Viewing curiosity as an evolved psychobiological emotional-motivational system relocates it. Researchers have tended to group curiosity together with the family of positive emotions (Ellsworth & Smith, 1988). This is sensible because both interest and enjoyment are appetitive and approach-oriented emotions, and the subjective experience of curiosity is a pleasing feeling of being activated, immersed, and absorbed (Izard, 1977).

But one could also view curiosity as a member of the family of *knowledge emotions*, a group of emotions associated with learning and exploring (Keltner & Shiota, 2003; Silvia, 2010). Some emotions have metacognitive roots: they are evoked when people appraise aspects of their knowledge. Surprise, for example, stems from appraising an event as unexpected (Scherer, 2001), and interest follows when people further appraise the unexpected thing as within their capacity to understand (Silvia, 2005, 2008). Confusion stems from appraising an unexpected, unfamiliar thing as essentially beyond one's ability to master or understand (Silvia, 2010, 2013). And awe, perhaps the most obscure of the knowledge emotions, comes from encountering something that cannot be assimilated to existing knowledge and thus requires accommodation (Keltner & Haidt, 2003; Nusbaum & Silvia, 2014).

One virtue of thinking of curiosity as a member of an emotion family is that it highlights its similarities with other motivational states. I find the relationship between interest and awe particularly intriguing. One possibility is that awe is simply the most intense pole of interest. Izard (1977) labeled the intense form of interest *fascination*, and some researchers have speculated that feelings of awe and wonder are what intense interest feels like (Campos, Shiota, Keltner, Gonzaga, & Goetz, 2013; Silvia, Fayn, Nusbaum, & Beaty, 2015). The subjective experience of awe—a feeling of being absorbed, immersed, and captivated—certainly has the hallmarks of interest's motivational function of exploration and engagement. On the other hand, perhaps awe represents a family of states that are sufficiently different in their origins and functions. For example, part of awe is a transcendent experience of feeling moved and touched (Bonner & Friedman, 2011; Nusbaum & Silvia, 2014), which seems outside of our common understanding of interest and curiosity. In any case, the relationships between curiosity and other emotions deserve more attention.

Implications for Concepts and Terms

We noted earlier that a functional analysis of curiosity is fundamental: it seeks to explain it using basic science models of motivation and emotion. Such models view curiosity as an innate system that motivates learning and exploration for its own sake. Thinking of curiosity as part of humanity's evolved motivational architecture can shed some light on how we define and talk about it.

In particular, some domains of interest research have drawn some sharp differences between curiosity and interest (for a review, see Grossnickle, 2016) or between types of interest (e.g., cognitive vs. emotional; Harp & Meyer, 1997). In motivation research, however, curiosity and interest are seen as synonymous, and I think a unitary view is more fruitful for understanding curiosity across all of psychology's domains. The English language gives different senses to these words, to be sure, but we should not be led astray by our lexicon. People tend to use *curious* to describe upcoming events (“I am curious to hear what he has to say”) or to refer to a stable quality of a person (“She is such a curious child”). *Interest* seems to appear more often to refer to ongoing or past experiences (“That was just so interesting!”). Usage has changed over time, however, which is a clue that we should not read too much into words. *Curious*, for example, was once common in contexts in which now only *interesting*, *amazing*, or *puzzling* would appear (e.g., “What a curious spectacle!” or “I saw the most curious thing on

the tram this morning”; see “curious, adj.,” entry 16a, OED, 2016), and *interest* is still an allowable word for stable dispositions (“My daughter is interested in so many things”).

The psychobiology of curiosity does not support the notion of distinct interest and curiosity systems (DeYoung, 2013; Panksepp, 1998; Zuckerman, 1994). Instead, I think that curiosity—like all things that are profoundly important to people—is widely lexicalized in language so that people can talk flexibly about a complex and pressing topic (Cruse, 2011).

Stable Aspects of Curiosity: The Specific and the General

Stable aspects of curiosity are tackled in other chapters in this volume, but they are worth mentioning here. In my own work, I have argued that a comprehensive analysis of interest should have something to say both about momentary emotional states (e.g., finding things interesting and feeling curious in the moment) and about stable aspects of motivation (Silvia, 2006; Silvia & Kashdan, 2009, in press). Curiosity can be stable in two senses: a concrete one and a general one. For the most part, researchers in education have focused on the former, and researchers in personality and neuroscience have focused on the latter.

In the concrete sense of stable, we have people’s unique and specific “interests.” Education researchers have been the most forward-looking in this respect, having emphasized the difference between *situational interest* and *individual interest* several decades ago (e.g., Renninger, Hidi, & Krapp, 1992). Individual interests are narrow domains of activity that people find interesting, valuable, and rewarding. Hobbies are perhaps the best example of how idiosyncratic such interests can be, such as when one meets people who collect Waltham 1883 model pocket watches, participate in Civil War reenactments, or develop recipes for fermenting their own kombucha. More widely studied, however, are academic and occupational interests. Interest researchers view individual interests as having a cluster of features: finding the domain interesting is clearly one, but valuing and knowing a lot about the domain are just as central (Hidi & Renninger, 2006; Schiefele, 2009). Individual interests essentially resemble concepts from other sides of psychology, such as the *personal goals* and *personal strivings* discussed in research on personality and motivation (Emmons, 1986, 1999). How people’s quirky hobbies and interests develop is a vexing problem that has bedeviled theories of motivation (for a review, see Silvia, 2006).

The general sense in which curiosity is stable—variation in “trait curiosity”—is much easier to study and understand. In this approach, researchers have identified and studied broad between-person individual differences in curiosity. The trait approach assumes that some people are more curious than others, although this could mean many things: they experience curiosity more often (frequency), they experience curiosity more strongly when they feel it (intensity), or they need less input for curiosity to be sparked (sensitivity).

A small but intriguing strand of research on trait curiosity has examined the genetics and neuroscience of curiosity, often in nonhuman animals. This line of work has explored heritable variation in genes related to novelty seeking, such as variants in the family of dopamine receptor genes (DeYoung, 2013). Traits associated with curiosity show substantial heritability in behavioral genetics studies (Bouchard & Loehlin, 2001; Zuckerman, 1994). These differences

are in turn apparent in the brain when people do tasks involving imagination, novelty, and exploration (e.g., Beaty et al., 2016).

The larger strand of research on trait curiosity, however, has sought to identify traits related to curiosity, develop valid measures of them, and then understand their meaning and implications. Some researchers have focused simply on trait-like curiosity (e.g., Kashdan et al., 2009; Spielberger & Starr, 1994). Other researchers have funneled in on likely facets of trait curiosity, such as facets reflecting specific or diversive curiosity, or facets reflecting exploration motivated by interest versus uncertainty (e.g., Litman & Jimerson, 2004; Litman & Spielberger, 2003).

More commonly, however, researchers have examined broader traits in which curiosity is a facet. The Big Five tradition, for example, locates curiosity within *openness to experience*, one of the major dimensions of personality (Goldberg, 1990; McCrae, 1994). There are many models of openness to experience (for reviews, see Oleynick et al., 2017; Nusbaum & Silvia, 2017), but curiosity is important to all of them. Central to openness to experience is an interest in new things, a willingness to explore new ideas, people, and places.

People high in openness to experience show higher curiosity in a wide range of contexts. They are more likely to find unusual art and music interesting, to try foreign food, to visit other countries, to enjoy intellectual ideas, and to seek graduate education, among other things (e.g., McCrae & Sutin, 2009). Similarly, people high in openness to experience are much more likely to generate new things. Openness to experience strongly predicts everyday creativity. In experience sampling (Silvia et al., 2014) and daily diary (Conner & Silvia, 2015) studies, for example, people high in openness are much more likely to be spending time on creative goals and hobbies. And openness predicts creativity at the sociocultural level as well: people high in openness to experience have more creative accomplishments over the lifespan (Feist & Barron, 2003). Curious people thus seek out, enjoy, and create novelty.

We can think of traits like openness to experience as parameters that tilt the scales of curiosity versus anxiety. In their model, Spielberger and Starr (1994) proposed that personality traits shift the relative weight of approach and avoidance motivation when people are faced with new things. Traits like openness to experience and sensation seeking, for example, incline people toward exploration; traits like anxiety and neuroticism, in contrast, incline people toward avoidance. By inclining people toward exploration, openness to experience fosters learning and creativity. At the same time, some things in life should be left unexplored, and openness to experience does increase the likelihood that people will delve into behaviors and situations that are unproductive or maladaptive (see Kashdan, 2009; Chap. 8).

Conclusion

Wanting to know something for its own sake, wanting to do something simply because it is interesting—this is part of human nature. In this chapter, we explored a functional analysis of curiosity. Modern models of motivation and emotion have much to say about the role of interest in learning, adaptation, and development. Fundamentally, curiosity motivates the enormous amount of learning that people need to do. Over time, people develop the skills and knowledge needed to flourish because they enjoy learning and are easily bored. Although some people are

more curious than others, and people's quirky interests will vary, all people are essentially curious creatures.

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