Epistemic curiosity and self-regulation

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ABSTRACT

Relationships between Interest (I) and Deprivation (D) type epistemic curiosity (EC) and self-regulation were evaluated in two studies. In Study 1 (Italians, N = 151), I-type EC correlated positively with positive outcome-expectancies and risk-taking, but negatively with thinking about negative outcomes. D-type EC correlated positively with emotional restraint, thoughtful evaluation, and concern over negative outcomes and potential risks. In Study 2 (Americans, N = 218; Germans, N = 56), I-type EC correlated positively with behavioral activation, especially fun seeking, whereas D-type correlated negatively with fun seeking. Neither EC scale correlated significantly with behavioral inhibition. These findings suggest that I-type EC corresponds to fun, carefree and optimistic approaches to learning, while D-type EC reflects greater thoughtfulness and caution regarding knowledge-search.

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1. Introduction

Broadly recognized as playing an important role in intellectual development, *epistemic curiosity* (EC) is the motive to seek, obtain and make use of new knowledge (Berlyne, 1954; Litman, 2005; Loewenstein, 1994). Individual differences in dispositional tendencies to experience and express EC have been empirically shown to predict setting self-directed learning goals and the attainment of intellectual achievements (Litman, Crowson, & Kolinski, 2010; Richards, Litman, & Roberts, 2013; von Stumm, Hell, & Chamorro-Premuzic, 2011). Research on the nature of individual differences in EC, conducted across a range of ages and cultures, suggest it is experienced and expressed in two correlated, but psychologically distinct ways: (1) a desire for new information anticipated to increase pleasurable feelings of situational *interest* (I-type), and (2) a motive to reduce unpleasant experiences of feeling *deprived* (D-type) of new knowledge (Huang, Zhou, Wang, & Zhang, 2010; Litman & Mussel, 2013; Piotrowski, Litman, & Valkenburg, 2014).

Given I- and D-type EC's shared association with knowledge-seeking, unsurprisingly, scores on measures of EC typically show strong convergence with one another (Mussel, 2010) and with related constructs (Litman, Collins, & Spielberger, 2005).

However, the special nature of EC's role in self-directed learning and intellectual achievement is better elucidated by examining evidence of how I- and D-type EC meaningfully *diverge*: I-type EC involves intellectual exploration aimed at the fun of discovering completely new ideas, while D-type EC reflects an uncomfortably intense "need to know," that energizes and directs seeking specific pieces of information needed to solve for a specific unknown (Litman, 2008). Supportive of the I/D distinction, each type of EC has empirically demonstrated unique associations with different metacognitive judgments, personality traits, affective experiences, self-directed learning goals, and levels of effort expended towards learning.

Consistent with I-type's orientation towards the pleasure of entirely new discoveries, I-type EC predicts state-curiosity reactions when individuals determine they "don't know" something (Litman, Hutchins, & Russon, 2005). It correlates positively with openness, preference for novelty, tolerance of ambiguity and expressions of positive affect, but correlates negatively with negative affective experiences (Litman, 2010; Litman & Mussel, 2013). I-type EC is found positively associated with setting learning goals aimed at achieving personal satisfaction (i.e., Mastery-achievement), but is essentially unrelated to striving for performance-related achievement (Litman, 2008).

In contrast to I-type EC, and in keeping with D-type's orientation towards striving to fill bothersome knowledge-gaps, D-type EC predicts state-curiosity levels when individuals have partial

knowledge relevant to an unknown (e.g., "tip-of-the-tongue" responses to questions) and is associated with more intense curiosity-states and more rigorous information-seeking behavior (Litman et al., 2005; Richards et al., 2013). D-type EC tends to correlate as much as or more with conscientiousness than openness, correlates positively with focused attention, impulse-control, and negative affect, but correlates negatively with ambiguity-tolerance, and is essentially unrelated to positive affect (Litman, 2010; Litman & Mussel, 2013; Piotrowski et al., 2014). As to learning goals, D-type EC is more complex than I-type, showing positive correlations with mastery-achievement, performance-achievement, and failure-avoidance, reflecting concern for the accuracy and usability of new knowledge (Koo & Choi, 2010).

1.1. Epistemic curiosity and self-regulation

As detailed in the previous section, research on individual differences in EC suggests that its I- and D-type dimensions each correspond to different underlying processes, different information-seeking activities, and different self-directed learning goals. An important implication of these findings is that I- and D-type EC may also be associated with different *self-regulation* strategies applied towards learning and achievement. Self-regulation in this context refers to the facility with which individuals selectively apply monitoring and control processes to achieving higher levels of knowledge and proficiency (Zimmerman, 2002). Indeed, numerous studies of learning and training, spanning a wide range of domains, have consistently demonstrated that self-regulation is critical not only to acquiring new knowledge and new skills, but to the achievement of high-level expertise (Hoffman et al., 2014).

Moreover, self-regulation not only refers to monitoring and controlling cognitive resources like attention and effort, but also to modulating emotional experiences aroused while learning (Balzarotti, Gross, & John, 2010); self-evaluating progress and formulating expectations about the likelihood of goal-achievement (Nenkov, Inman, & Hulland, 2008); assessment and management of potential risks associated with pursuing one's goals (de Haan et al., 2011); and valuation of how rewarding new knowledge will be once learned, which may also impact future learning goals (Carver, 2006). At present, the nature of the relationships between the aforementioned self-regulatory factors and I- and D-type EC – the fundamental motives for learning new knowledge – remain largely unexplored. Given independent evidence of the importance of both EC and self-regulation to self-directed learning and achievement, the direction and magnitude of the relationships that may exist between EC and self-regulation begs further consideration.

Previous research suggests that I-type EC is associated with an open, positive approach towards learning, implying a broadly optimistic outlook regarding new discoveries. Additionally, acquiring knowledge capable of satisfying I-type EC places relatively modest demands on the information-seeker; to sate I-type curiosity-states, new information merely needs to be *engaging*, but does not necessarily need to be useful (i.e., factually accurate and/or facilitate understanding), as it does for D-type EC. Although if something expected to be interesting turned out to be dull, this could lead to disappointment (Loewenstein, 1994), the extant theory and research on I-type EC all point to its association with optimistic expectancies about discovery (Maner & Gerend, 2007). Moreover, given that I-type experiences involve seeking new knowledge for the inherent joy of it, as well as greater ambiguity-tolerance, the arousal of I-type states is likely to include expectations that new sources of pleasurable intellectual stimulation may be discovered serendipitously. As such, we would expect I-type EC to involve uninhibited expressions of positive affect, positive outcome-expectancies, little apprehension over potentially

negative outcomes, and an orientation towards having fun while learning.

Like I-type, we might posit that D-type EC also involves optimism regarding knowledge-search; expending time and energy to seek out new information must be preceded by the expectation that one's efforts will pay off. However, theory and research on the I/D distinction suggest that D-type EC states can only be satisfied by the *right* piece of information – merely discovering *any* new knowledge will simply not suffice (i.e., it is *not* equivalent to Need for Closure; Litman, 2010); to reduce D-type states, the newly learned information must be able to *accurately* resolve an unknown. Moreover, D-type curiosity-states are theorized to resemble a "need-like" condition, involving unpleasant feelings of tension and perplexity, which increase until satisfactorily resolved. This interpretation is consistent with evidence of positive relationships between D-type EC and negative affect (Litman, 2010) and D-type's association with TOT states (Litman et al., 2005) and the "tingling, torment, [and] turmoil" (Schwartz, Travis, Castro, & Smith, 2000, p.19) that accompany them. Unlike I-type EC, D-type does not orient individuals to learn new things just for the fun of it, but rather underlies wanting to develop a deeper, more meaningful understanding of a subject (Richards et al., 2013).

If the activation of D-type EC produces mild to moderately negative experiences, for which mitigation has fairly stringent criteria (i.e., new knowledge cannot merely be interesting, it must facilitate comprehension), then D-type EC may coincide with greater concerns about *potential risks* involved in knowledge-search – i.e., one might expend considerable resources to seek out and make sense of new knowledge, only to fail in the search or subsequent sense-making. Failure means wasted resources, continued uncertainty and sustained negative affect. A greater awareness of the risks associated with expending effort for potentially "useless" information suggests that D-type EC involves *lower* levels of optimism about knowledge-seeking, and more consideration of the risk of negative outcomes. These predictions are highly consistent with previous research that shows D-type EC is associated with setting both performance-oriented and failure-avoidant goals (Litman, 2008), and with concerns about the utility of new knowledge (Koo & Choi, 2010). Further, given recent findings that indicate D-type EC is positively correlated with impulse-control (e.g., Piotrowski et al., 2014), we would also expect D-type EC to be associated with greater deliberation and caution before exerting effort to obtain new information.

Consequently, in regard to self-regulation, we would predict D-type EC to be positively associated with careful evaluation, consideration of negative outcomes, emotional restraint, and prudent assessment of potential risks in knowledge-seeking. However, it is important to note that D-type EC, like I-type, is theorized and empirically shown to reflect an *approach* orientation; thus, any hesitation associated with D-type EC should not result in avoidance, but rather, thoughtful and wary approach. Indeed, previous research on D-type EC has shown it to be associated with more intense curiosity-states and more knowledge-seeking behavior (Litman et al., 2005), suggesting that D-type EC should correspond to drive-like approach, at least once one determines that initiating knowledge-search is warranted.

1.2. The present studies

Previous work on the I/D distinction suggests there may be different self-regulatory strategies uniquely associated with each expression of EC, but these relationships remain unexplored. Thus, the major goal of the present studies was to examine relationships between I- and D-type EC and several self-regulatory processes: emotional regulation, risk assessment, outcome