Introduction

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I love knowing. My heart loves to know and so my heart tells my brain to do everything necessary in order to know and it happens.

(Jonathan Kreitler, age 5 yrs.)

It is difficult to determine precisely the date on which cognition was "born," that is to say, identified as a discipline in its own right within the broader context of psychology. However, it is quite clear that soon thereafter the issue of its relations with motivation arose.

While such notable theorists as James (1890), Baldwin (1911), and Dewey (1913) each discussed the relation of cognition and motivational engagement, it has only been in the last few years that there has been a revival of interest in motivation and the interrelation of cognition and personality. This has led to publications dealing with the interrelations of cognition with motivation (Sorrentino & Higgins, 1986), social behavior (Baltes & Staudinger, 1996), personality (Kreitler & Kreitler, 1990; Saklofske & Zeidner,1995), interest (Renninger, Hidi, & Krapp, 1992), and emotion (Power & Dalgleish, 2008), to mention only a few. This emerging interest in motivation is linked to an increasing concern for studying the individual in context, examining function as well as structure, analyzing the relation between cognitive and social development, recognizing the importance of cognitive science to the study of learning, and acknowledging the powerful impact of affective functioning on cognition.

The growing awareness of the role of cognition in various fields of psychology has been paralleled by the extension of information about the amazing evolutionary development of the human brain, in particular of those areas that implement cognition. This has led to the deepening conviction that since cognition is so highly developed in human beings and has come to engage such an important part of the human brain – especially in recent phases of

evolution – it is highly probable that it fulfills an important role in regard to the major aspects of human functioning and survival – including everyday behavior, social behavior, emotions, physical health, mental health, and well-being.

The increasing impact of cognition in different domains of psychology could be viewed as revealing the unfolding ontogenetic development of cognition. The increasing cerebral space occupied by cognition could be viewed as revealing the phylogenetic development of cognition. The present book is the outcome of the insights generated by the confluence of both the ontogenetic and phylogenetic developments of cognition.

Primary indications of insights of this kind have occurred within particular subfields of psychology. In the present volume, these insights have been offered a much more extended space and salience. Moreover, the range of contexts in which cognition is analyzed has been enlarged. The standard contexts – such as emotions, learning, and personality – have been amplified by the addition of newcomers on the scene – such as physical health, genetics, and biological evolution.

Accordingly, following this extension, motivation has emerged as a concept with a new unfolding connotation. Motivation is commonly conceived as representing those forces that arouse organisms to action toward a desired goal and provide the reason and purpose for behavior. This conception seems to attribute to motivation a specific directionality, awareness of a goal or purpose on the part of the organism, the involvement of consciousness of the acting organism as well as of needs for purposefulness and meaningfulness. Assumptions of this kind may have unduly limited the meanings of motivation, excluding the wealth of connotations that have accrued to the concept of motivation in recent years, including – at least in regard to cognition – the impact of personality, emotions, health, and situational factors, to mention just a few. The more updated conception of motivation considers it as "a modulating and coordinating influence on the direction, vigor and composition of behavior", which "arises from a wide variety of internal, environmental, and social sources" (Shizgal, 1999, p. 566). In that sense, motivation has turned, rather, into a kind of cognition-modulating context whose functioning impacts not only the activation of cognition per se but also determines the manner, extent, and form of its involvement and manifestations.

The reconceptualization of the concepts of motivation and context in relation to cognition has led to a renewed emphasis on interdisciplinary considerations in studying cognition and exploring the range of its manifestations. The implementation of this approach has made it necessary to apply an

innovative strategy to interactions between cognition and its contexts. This strategy consists in a double-pronged approach whereby, on the one hand, the impact and effects of various major motivational factors in regard to cognition are explored and, on the other hand, the effects of motivational factors are explored in regard to the functioning of cognition in specific cognitive domains. The two approaches represent two complementary modes of interdisciplinary thinking.

The first approach prompts questions such as 'How do emotions affect cognition'? 'What is the impact of culture on cognition'? 'In what ways does genetics affect cognition'? 'How does personality shape cognition'? It will be noted that in these questions emotions, culture, genetics, and personality are conceived as motivational forces or vectors external to cognition that affect its activation, development, and functioning.

The second approach leads to questions such as 'How does motivation of any sort affect the functioning of cognition in the domain of creativity'? 'How does motivation affect problem solving'? 'What kinds of motivation were found to affect learning'? 'In what ways could a broader and deeper exploration of motivation improve our understanding of the functioning of intelligence'?

The first approach is represented in the different chapters of Part I in the book. They are grouped together under the heading of 'Explanatory Concepts and Contexts'. The second approach is represented in the chapters of Part II of the book. They are grouped together under the heading 'Domains of Cognition in Context'. In the first part, the emphasis is on the explanatory concept that is expected to shed light on cognition as a whole, as a system within the total functioning human being. In the second part, the emphasis is on specific domains of cognition and the manner in which motivation is interwoven within each domain and its actual or potential contribution to shedding light on the functioning of that domain.

Part I includes 12 chapters. Chapter 1 (by Kruglanski & Sheveland) focuses on epistemic motivation, which has been one of the major cornerstones in opening up the vista of the interactions of cognition with motivation. The chapter deals with the role that epistemic motivation plays in the knowledge formation process, in particular reference to the need for cognitive closure construct. Following a general depiction of the epistemic process and the function that the need for closure fulfills in this endeavor, empirical research is presented about the need for closure's consequences at the intrapersonal, interpersonal, and group levels of analysis. Finally, the real-world implications of the need for cognitive closure in domains of political ideology and intergroup relations are described.

Chapter 2 (by S. Kreitler) focuses on the cognitive orientation (CO) theory, which is one of the most comprehensive approaches to cognitive motivation. The chapter presents the CO theory of cognition, which enables predicting cognitive acts as well as changing and improving them. Cognitive acts are described as a function of a motivational disposition, anchored in clusters of four belief types referring to themes representing underlying meanings, and of a cognitive program implementing the motivational disposition. The motivational disposition is shaped by CO clusters for cognition, cognitive functions (e.g., memory, curiosity), types of thinking (e.g., creativity, intuitive thinking), and domains of contents (e.g., mathematics, psychology). Cognitive performance is further affected by the state of the cognitive system as a whole (viz. state of consciousness) and current emotions.

Chapter 3 (by Ackerman) deals with the multiple and constantly emerging effects of personality on cognition. Ackerman reviews a conceptual framework that differentiates between typical behaviors (in the absence of a strong situational press) that are the target of most personality-trait assessments and behaviors of maximal performance (under conditions that elicit the greatest level of effort) that are the target of most cognitive ability and aptitude-trait assessments. Trait complexes, that is, groups of personality and cognitive traits that have significant common variance, are described along with personality traits that have more pervasive associations with cognitive processing. Interactions among these personality and cognitive traits are considered in a broad developmental context, with an emphasis on implications for work and school contexts.

Chapter 4 (by Zihl, Szesny, & Nickel) focuses on cognition, emotion, and motivation from the pathological perspective. Psychopathology is one of the factors whose impact on cognition has been recognized quite early in the history of psychology. Neurobiological, neuropsychological, and psychopathological evidence supports a concept of functional specialization in these functional systems. However, there is intensive interplay between the systems of cognition, emotion, and motivation. The consideration of dissociation and association of impairments in cognition, emotion, and motivation is important not only for a better understanding of the context in which, in particular, cognition and emotion operate, but also for a valid characterization of cognitive and emotional dysfunctions resulting from morphological or pathophysiological alterations of the structures that build the underlying networks.

The following three chapters deal with various aspects of the emotional impacts on cognition. Chapter 5 (by M. Eysenck) is concerned with the negative effects of anxiety on cognitive performance. The main focus is on processing efficiency theory and attentional control theory, which are designed

to account for those effects. Both theories assume that there is an important distinction between performance effectiveness and processing efficiency reflecting the relationship between performance effectiveness and use of processing resources. In addition, attentional control theory assumes that anxiety impairs two major executive functions involving inhibitory and shifting processes, respectively. The chapter provides a detailed discussion of the research in recent years concerned with testing aspects of these theories, outlining future research directions.

Chapter 6 (by Stewart & Panksepp) delves into the biological foundations of affective systems that serve as sources for both cognition and motivation. Motivation is derived from core emotional command systems in the mammalian brain. Central to the different emotional command systems is that of SEEKING, a spontaneous generator of neurobiological events that goad the animal toward exploration. The eagerness and expectancy corresponding to this exploratory/investigative foraging drive are massively integrated by brain dopamine activity into a coherent BrainMind state called SEEKING that helps establish the neural conditions for appetitive learning for all kinds of rewards, including the urge to PLAY. SEEKING remains central throughout life, promoting enthusiasm for learning and living, is critical for a life well lived, but can also be led to excesses, in the form of addictions.

Chapter 7 (by Wimmer) deals with the organic origins and evolution of motivation, emotion, and cognition. The major assumptions are that in early periods of phylogenetic development, cognition, emotion, and motivation have been closely bound together, without ever losing their interactive dynamics, and that cognitive functions even on the highest levels are always closely tied to their emotional and motivational substructures. Thus, each analysis of the evolution of cognition has to consider the evolution of emotion/motivation. This transdisciplinary approach is supported by data from classical ethology and developmental psychology as well as by investigations of the symbolic abilities of human beings.

Chapter 8 (by Au, Wan, & Chiu) complements the phylogenic approach by focusing on the social and cultural context of cognition. The authors define culture as a network of procedural and declarative knowledge, shared among a collection of interconnected individuals. If a knowledge item is activated (i.e., when it is cognitively accessible to the individual and applicable to the context), it can affect subsequent judgments and behaviors. Cultural differences in judgments and behaviors reflect cultural differences (a) in the specific knowledge items available in the culture or (b) in the prevalence of situational cues that render a certain subset of knowledge items chronically accessible to members of a culture. Situational and individual difference factors (e.g., need

for firm answers, need to belong, cognitive load, or mortality salience) that increase individuals' reliance on culture to provide quick and widely accepted answers tend to enlarge cultural differences in judgment and behavior.

The next three chapters are devoted to more purely physiological aspects. Chapter 9 (by K. Edlinger) addresses the confluence of evolutionary and cultural developments as an epistemologically active vector. Human beings, and in particular perception and cognition, result from a long evolutionary process shared by all species. In Darwinian theories, evolution of organisms and their abilities are considered as outcomes of adaptation. The shortcoming of these approaches is that they lack a consistent theory of organisms, viewed as mosaic-like arrangements of characteristics. In contrast, the theory of organismic constructions, grounded in constructive realism, considers organisms as mechanical constructions constantly engaged in converting energy, functioning in accordance with internal needs. Organisms are not blueprints of their environment. Their prime qualities are dynamics, autonomy, and spontaneity. Cognition is an activity of autonomous entities, actively constructing their own realities in accordance with special internal needs. This view corresponds also to medicine and applies to the functioning of the nervous system, characterizing the organism's relations with the environment, especially perception and cognition.

Chapter 10 (by W. Johnson) explores the issue of what and how genes affect cognition. In particular, the chapter addresses the problem of the paradox between the claims that cognition is heritable but that genes do not control our thoughts. The author reviews the history of the paradox since the development of Mendel's ideas of genetic transmission across generations and Darwin's theory of evolution, and describes the Modern Synthesis that underlies current ideas of genetics and evolutionary biology. The Synthesis has been used to develop the common measures of genetic influences on human cognition. The likely common violations of the assumptions underlying these measures have implications for understanding genetic influences on cognition. Also, issues involved in identifying the specific genes that contribute to cognition are discussed.

Chapter 11 (by N. Jaušovec & K. Jaušovec) addresses the issue of the relationship between brain functioning and cognition. It describes the brain and techniques for studying its function and structure, referring to the theories about the interactions. Following this introduction, it focuses on the relationship between intelligence and brain activation patterns in response to the performance of cognitive tasks employing many different demands. Further, it presents recent neuroscientific research of emotional intelligence, creative thinking, and individual differences in personality traits as well as

the evidence on gender-based differences in performance and some possible relations to differences in brain structure and function.

The closing note of Part I is provided by Chapter 12 (by Kreitler, Weissler, & Barak), which leads us into the exciting presently unfolding domain of the impact of physical health on cognition. The review presents empirically found effects on cognitive functioning of physical disorders (i.e., cardiovascular, diabetes, gastrointestinal, hematological, nephrological, respiratory, hormonal, cancer, neurological, chronic pain, and dermatological), of sensory disabilities (e.g., deficiencies in vision or hearing), special bodily states (e.g., sleep loss, pregnancy, menstruation), medical treatments (e.g., surgery, chemotherapy, common drugs), and psychological reactions to physical disorders and treatments (e.g., anxiety, worry, denial). In view of the pervasive impact of physical disorders on cognitive functioning, it is recommended to consider the physical effects in the research and theory of cognition.

Part II includes 10 chapters. They are devoted to highlighting the actual and potential contributions of motivational factors to cognition in its different manifestations, in a variety of domains. Chapter 13 (by Gilhooly & Fioratou) deals with interrelationships between motivation, goals, thinking, and problem solving. It is argued that general motives lead to more specific goals, which in turn guide problem-directed thinking by providing a basis on which to select possible actions or develop possible subgoals. Concerning expert problem solving, it is noted that expertise is developed as a result of extensive deliberate practice carried out typically for at least ten years. Such extended practice depends on high continuing levels of motivation. Intrinsic enjoyment of the domain is important to begin and maintain the process of expertise acquisition. Intrinsic motivation also plays an important role in regard to creativity. In many circumstances, extrinsic motivators are found to impair creative performance, especially if they do not depend on results and are not informative about performance quality.

Chapter 14 (by Zakay & Fleisig) examines the role of motivation in heuristic thinking. Any kind of heuristic, cognitive or motivational (i.e., with or without evident motivational gains), is initiated by a fundamental motivation to act as fast as possible while minimizing the consumption of mental resources in face of uncertainty. Since the activation of motivational heuristics is associated with a need to overcome some motivational threat, it should be a product of a dual-stage process: first, the meaning of the situation is analyzed and the existence of a potential motivational threat is identified; then, the activation of a specific heuristic is executed in line with the identified meaning. Regular metacognitive processes monitor the heuristic thinking process so that a decision is reached whether or not a correction is needed.

Chapter 15 (by Svenson) is devoted to the domain of decision making. The author differentiates in human decision making between process approaches that focus on how decisions are reached and structural approaches that predict choices by the parameters of the problems. The motivation for decision making can be studied in terms of fundamental motivation (resulting from needs for food, social closeness, etc.) or process and representation motivation that focuses on how the individual is motivated to process the information to reach a decision. From the 1950s to the 1990s, process approaches dominated the scene. The situation changed when an interest in emotion, affect, and individual differences brought different fundamental motivations into the field, enriching research on decision making with advanced treatments of fundamental motivation.

Chapter 16 (by Born & Gatarik) extends the exploration of decision making. It focuses on the relation between knowledge and decision making on the basis of the relation between language, information, and reality, which depend on both cognition and motivation. In this context meaning-both as mediator as well as an explanatory way to think about the world – can play a decisive role, determining the limits of any formal decision support system. Both the interplay of knowledge and life and the scheme Language-Information-Reality are essential tools for analyzing the influence of meaning on the acceptance of decisions, and both contribute to an understanding of the relations between decision making and knowledge, cognition and emotion/motivation.

Chapter 17 (by Renninger & Riley) deals with relations of interest and cognition. The theory and research on the relation between interest and cognition suggest that interest affects both the "why" of attending to some content as well as the "what" of cognition. The chapter includes a detailed presentation of the case of L –, an adolescent girl who participated for five years in out-of-school summer science workshops for at-risk youth. Data from her and her peers' engagement in the workshop are contrasted with those from a study of student writers of the same age in order to highlight new aspects of the interplay between interest development and cognition in the learning environment.

Chapter 18 (by Efklides) focuses on learning in the broad sense of the concept. It presents the Metacognitive and Affective model of Self-Regulated Learning, describing the relations between metacognition, cognition, affect, and motivation. The model includes two functioning levels: (a) the Person level that represents traits and what the person brings to the task situation; and (b) the Task x Person level, which involves close interrelations of cognition, affect, metacognition, and regulation of effort (i.e., motivation) when the

person works on the task, so that there is consistency and coherence in the person's actions and updating of person characteristics. Metacognition relates cognition and affect and motivates control of cognition and effort/affect as well as attributions about competence in co-regulation and other regulation in collaborative learning.

Chapter 19 (by Panther) shows that motivation is a crucial concept in linguistic theorizing. In particular, a case is made for the relative motivation of grammatical structure by conceptual and pragmatic factors. For purposes of illustration, a case study on English question tags is presented, and it is shown that their form is motivated, although not predictable, by factors such as communicative function, metonymic principles, inferencing within speech–act scenarios, and economy of coding. Tags are found in many other languages than English, but what kinds of tags appear in a specific language cannot be predicted.

Chapter 20 (by Zigler) deals with the role of motivation in regard to cognitive functioning of individuals at the extremes of the IQ curve – the mentally challenged and the gifted. The motivational factors are, in both cases, environmental circumstances, such as educational opportunities, family support, and encouragement in the workplace; personality and behavioral tendencies, such as outerdirectedness or innerdirectedness, responsiveness to tangible or intangible rewards, positive or negative reactions to others; and cognitive-motivational determinants, such as beliefs referring to motivationally orienting themes in regard to cognitive performance. Despite differences in the specific nature of these factors, their joint impact affects the level of cognitive performance in the two groups.

Chapter 21 (by Singer & Singer) deals with reflective self-awareness, daydreaming, anticipatory fantasy, and planning, relating such consciousness to more general cognition, theories of emotionality (e.g., Mandler, Baars, and Tomkins), motivation as reflected in Klinger's current concerns studies, and exploring its origin in the imaginative play of children as well as its implications for theory of mind and heightened self-awareness. Further, research is presented about ongoing consciousness in adults on the basis of signal detection experiments, natural occurring thought, and concepts of a self. Findings based on brain-imaging methods have supported the psychological experimentation by demonstrating a brain-default network that becomes active when external stimuli processing is reduced. The implications of these studies for understanding not only retrospective thought but also planning, imagination, aesthetic, and scientific creativity are indicated.

Chapter 22 (by Runco & McGarva) concludes the book with a focus on creativity. In the last decades, the study of creativity has grown dramatically,

reflecting the recognition that it affects not only the arts but all forms of innovation and entrepreneurship in the sciences, technology, and education. Runco approaches the field by considering the who, what, where, when, why, and how of creativity, focusing mainly on the why. The chapter explores what that means, that creativity is motivated or is the result of particular motives – both extrinsic and intrinsic – from various theoretical perspectives (i.e., the Freudian, humanistic, behavioral, psychoeconomic theory, and theory of personal creativity).

Each of the chapters is independent of other chapters, and represents the authors' view with respect to the discussed subject matter as a whole as well as their own special view of the theme, addressing theories, methodologies, and empirical findings. In most cases, no specific studies are presented in detail. The presentation is inclusive, relying on empirical material as examples demonstrating theoretical constructs, conclusions, and implications.

The chapters in each of the parts of the book separately and in the two parts together as a whole complement each other and are designed to constitute the groundwork of an integrative and coherent foundation for forging a reconceptualization of cognition in the context of motivation and beyond.

The explorations of cognition in the multiple motivational contexts may promote the emergence of a new approach to cognition that will highlight its pivotal role in psychology, nurtured by the new unfolding interactions between the motivations and performance, needs and emotions, genetics and learning, thinking and feeling, internal and external environments, and last but not least between physiology and psychology. Only the future can tell whether this growing and enriched ecological environment for cognition will result in a second cognitive revolution in psychology.

This introduction would not be complete without expressing the deep appreciation and gratitude of the editor to the authors of the diverse chapters who have contributed of their expertise, knowledge, and extraordinary abilities and insights to each of the chapters, which constitute real steps forward along the broadening road of exploration and expanding role of cognitive sciences as a whole and cognition in particular. In particular, I would like to mention the special contribution of Ann Renninger, whose insights, cooperation, and support all along in diverse forms have served as a source of inspiration and great help in completing the project of this book.

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