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From Multiperspective to Contextual Integrative Thinking in Adulthood: Considerations on Theorisation of Adult Thinking and its Place as a Component of Wisdom¹

Abstract

This critical literature review traces the roots of how adult cognitive development and learning are conceptualised. It addresses some implicitly included historical and philosophical concepts, analysing especially the concept of change, and ontological assumptions included in the Piagetian and neo-Piagetian “postformal thinking” traditions. Two major theories that have had an important impact on modern scientific discussion regarding adult cognitive development are discussed: Piaget’s and Perry’s theories of logical thinking and assumptions of knowledge. They have served as basic sources for several new innovative models with their respective, mutual similarities and differences. The chapter offers conceptual criticism for some widely used terms, such as postformal or relativistic-dialectical thinking, and proposes that these be replaced with the term ‘contextual integrative thinking’ or just ‘integrative thinking’. The chapter also addresses the hermeneutic ontological preunderstandings underlying different theoretical approaches. Particularly, this chapter highlights the position of multiperspective and contextual integrative thinking as alternative concepts and also as subcomponents of wisdom. Wisdom is defined as the ideal goal of human behaviour, based on cultural values. Adult developmental and wisdom research are closely connected by the notion of integration. This chapter reflects the overarching idea of the whole book: to offer a multidimensional and holistic view on adult cognitive development, adult learning, and related research.

Theoretical Background: Basic Concepts

This chapter introduces the field of adult cognitive development by means of critical literature review. Major trends, schools and traditions will be described and analysed to get a comprehensive, yet critically evaluative synthesis of the field.

Psychology as a discipline examines human action, behaviour and experiences and the ways in which they change over time. In Anglo-American and “Western” cultures the roots of many current terms can be traced back to about 2000 years, to ancient civilizations of Near East and Southern Europe. Etymologically, the Greek term ‘*psykhē*’ refers to “the soul, mind, spirit; life, one's life, the invisible animating principle or entity which occupies and directs the physical body; understanding, the mind (as the seat of thought), faculty of reason” (Psyche, 2019b). Oxford Lexico refers to the term ‘psyche’ (Psyche, 2019a) as follows: “Mid-17th century via Latin from Greek *psykhē* ‘breath, life, soul’.” *Cognition* comes from the term *cognicioun* (Latin), “ability to comprehend, mental act or process of knowing” (Cognition, 2019b). Further, the term ‘cognition’ is defined as coming from “Late Middle English from Latin ‘*cognitio*’ (–), from ‘*cognoscere*’, ‘get to know’.” (Cognition, 2019a).

In modern scientific research, cognition refers to all phenomena that are related to acquiring, assimilating, and processing knowledge, such as perception, attention, learning, memory, logical thinking, decision-making, creative thinking, socio-cognitive skills, and intuition. In short, cognition refers to the mental functions that we use to acquire knowledge, or as Sternberg and Funke (2019) say, how people represent and process information. On the one hand, it is always intrapersonal but on the other hand, essentially also a social and collective phenomenon. In other words, cognition is about personal, internal and experiential processing in an individual’s brain and mind, but at the same time shared and collective (Resnick, 1991). It is worth noting, however, that the concept of cognition in our rapidly changing world can be extended beyond our physical bodies and to technological fields, as integrations of human being with artificial intelligence, for example. Thus the whole concept of cognition may soon need to be revised in some way.

Interestingly, the nowadays widely used term ‘*development*’ appears to be a relatively recent term in English vocabulary; according to Oxford Lexico (Develop, 2019) the term ‘*develop*’ traces back to “Mid-18th century (in the sense ‘unfold, unfurl’): from French ‘*développeur*’, based on Latin *dis-* ‘un-’ + a second element of unknown origin”. On a general level, development as a scientific concept can be defined as a change that is predictable by nature and that emerges sequentially and consecutively. *Adult development* refers to consistent, qualitative changes in the outer and inner behaviour of mature individuals as a result of both internal and external interaction with the environment. These changes are partly based on hereditary, endogenous and exogenous effects, the ability to adapt, and individual factors, such as goal-setting, will, agency as well as on goal-oriented decisions (Hoare, 2011). The highly general rubric ‘adult cognition’ refers e.g., to information processing theories, i.e., progress and decline of intelligence or memory in general (Schaie & Zanjani, 2006). More importantly for the present context, *adult thinking* can also be studied from a developmental psychological perspective, which is predominantly based on Piagetian theorisation, but also on some other major psychological theories as well (Kallio, 2015). In further discussion, I will focus especially on the “postformal” and “relativistic-dialectical” thinking models, and at some instances, also on some notions associated with these, especially on learning and wisdom.

Development in adulthood is twofold: it can include both progress and regress, going forward and backward (Hoare, 2011). The most significant differences in theories of this field are related to how this change is described. Different terms are used, such as stage, level, substage, and related transitional periods between these. The models often refer to general developmental progress which is more or less stable and structured. Change is typically, but not always necessarily, understood as something progressively hierarchical; advancing towards higher and higher stages, assuming the trend to be toward the better. This was the dominant idea at the end of the 20th century, but rivalling perceptions have been emerging since then. After the introduction of biological evolutionary theory, these hierarchical models and theories had their heydays, but they do have influence still today (Kohlberg, 1984; Piaget & Inhelder, 1969) with various neo-Kohlbergian and neo-Piagetian approaches (see articles in Section I in this book). (Note that as an alternative for ‘neo-Piagetian’, also the term ‘post-Piagetian’ is used in this book; similarly to e.g., neo-Kohlbergian etc.). However, non-hierarchical development is also a possible assumption, i.e., non-normative consecutive periodicity as phases (Erikson, 1978; Freud, 1989).

There are several puzzling questions regarding the concept of development. The main antinomies in human development are e.g., nature vs. nurture, mind vs. body, maturation vs. experience (or innate vs. acquired), continuity vs. discontinuity, stability vs. instability, constancy vs. change, quantitative vs. qualitative change and individual vs. context (Lerner, 2018, p. 136). There are also several different assumptions regarding the direction and nature of development. For instance, we can ponder whether development is uni- or multilinear and whether it is proceeding along a particular route or various routes, and whether there is *telos* or not. In addition, what one person regards as development, may well be regression to another. Besides normative development, individual variation may be an important factor in producing unpredictable development. Universal development is a tempting model of explanation for many theorists. In sum, the concept of development is complex and the above-mentioned questions are constantly discussed by various scholars (Overton, 2006, 2010; Lerner, 2018; Lerner & Overton, 2008).

According to Lerner (2018), development is *not* an absolute observation-based concept. If it was, all researchers would agree when they observe the change of human behaviour over time, always defining it as development. The same phenomenon, however, can also be defined as learning or some other kind of change in the already existing structure without the emergence of something qualitatively new, depending on the conceptual background of the researcher who observes the phenomenon (Lerner, 2018). Any interpretative claims of reality should thus always be contextualised with our world-view and its mode of reasoning (Kincheloe & Steinberg, 1993). It is also worth reminding that our knowledge and implicit assumptions are Eurocentric and Anglo-American, based on the paradigmatic scientific shift which emerged first in the Scientific Revolution (Kuhn, 1962). According to Hans-George Gadamer (2008) and his idea of hermeneutical pre-understanding, an observer is ontologically tied in fundamental pre-existing conditions in perception – here “philosophical ontology” refers to “a branch of metaphysics concerned with the nature and relations of being” (Ontology, 2019). In their interpretations and meaning-making the observers are never free from their conditioned minds and they understand objects and things according to their pre-existing thinking patterns.

Learning as a concept also includes an idea that something new emerges. As a term it traces back to medieval times: “Old English *leornung* "study, action of acquiring knowledge," verbal noun from *leornian* ... Meaning "knowledge acquired by systematic study, extensive literary and scientific culture" is from the mid-14th century” (Learning, 2019). According to Hoare (2011), adult learning refers to the change in behaviour and action, acquiring new knowledge or skills, as well as to change in earlier knowledge structures. Learning outcomes and results are usually ranked as a hierarchy from lower to higher levels according to socially predetermined criteria and values. This implies analogical developmental stages or levels, even if less strict claims of intrinsic structure of normative transformations. Learning is also expansive in the sense that something learned earlier can be transferred to new settings. On the other hand, the concept also includes the possibility of unlearning (Becker, 2005). Both learning and development have to do with the concept of change, which will be addressed later.

Illeris (2009) argues that there is no established, consistent definition for learning. On the contrary, new models of learning are constantly introduced – which applies to adult developmental models as well. Illeris states that the research of learning is no longer focused on skills and knowledge, while the research field has expanded to encompass the meaning of emotions as well as the social and societal dimensions. This means that learning is viewed in relation to the context. The definition of learning presented by Illeris (2009, p. 3), however, comes close to the one suggested by Hoare (2011): Learning refers to any process where there is a permanent change in the skills (capacity) of a living organism; change that is not a result of biological factors or age. In developmental psychology, however, age with related physiological changes, especially in childhood, is regarded as an essential factor (Piaget & Inhelder, 1969).

Change as a Core Concept in Development and Learning

What is actually meant by *change* in general? The concept of change can be formally defined shortly as follows: ‘There is change if and only if there is a subject S that persists and retains its identity along from x_1 to x_2 , and there is a difference that is exhibited by a property, state or part properly predicated of S, from x_1 to x_2 ’ (Hussey, 2002, p. 105). S means here anything that can change (e.g. moral code, way of thinking, learning), and x_1 and x_2 are distinct locations or suitable dimensions (e.g., time) (Hussey, 2002; Kallio & Marchand, 2012). However, a mere change between two points

in time as such does not necessarily mean the emergence of something new. Besides, change is not always for the better (e.g., aging with deteriorating health).

A philosophically important question in relation to change is whether the identity of the changing object remains logically the same in the process or not (Kallio & Marchand, 2012). The concept of change is paradoxical in its nature; it involves a qualitative shift during which the earlier form of a phenomenon stays structurally the same, but simultaneously changes to an extent and thus includes a new element. It is a philosophical issue: We can define the phenomenon either as remaining the same or as being different, either consistent or inconsistent at different points of time, depending on which perception is conceptualised (Kallio & Marchand, 2012; Mortensen, 2016).

Mortensen (2016) points out that Buddhism, for example, denies the permanence of identity over time, and assumes in general that nothing is permanent. Thus, our Western way of looking at identity as a sustained, even if changing property is just *one alternative approach* to the concept of change, and cross-cultural studies in various fields should study and explicate latent cultural, historical and philosophical beliefs and other assumptions more closely (Malott, 2011; Kincheloe, Hayes, Steinberg, & Tobin, 2011; Gidley, 2016).

We usually suppose that developmental progress is linear in time, growing from lower to higher levels through constant change, or with certain *telos*. Linear progress in time is, however, only one possibility to understand change. In some cultures change is seen as a cyclical, continuous spiral-like process without any specific beginning and end. Linear time can be defined in very simplistic terms as an interval from point A to point B on a timeline: moving from past to present and from present to future (a metaphor “time as an arrow” has often been used). Moreover, time is not dependent on the subject perceiving it. These two conceptions of time may, however, be complementary to each other, so that both linear and cyclical time and processes can be combined in understanding change within some time period, visualising it as a spiral-like change (see Chapter 3). The notion of spirality may originate from the rhythmic patterns of the natural world, like the cycles of day and night or annual seasons due to the Sun’s apparent rotational motion in relation to the Earth. This cyclic-rhythmic perception of time can still be seen in our weekly, monthly, and yearly rhythms (Zerubavel, 1989).

When describing development and learning, important conceptions include the direction of change: change can be both *vertical* and *horizontal*. The first refers to an assumption that there is at least a partial hierarchy for the state of affairs. The term *hierarchy* comes from Pseudo-Dionysius (ca. late 5th to early 6th century), as “hierarchia”, “neologism from Greek ‘hieros’, “sacred” and ‘arkhia’, “rule” (Kleineberg, 2017): its roots are thus religious, with reference to “sacred rule” issued by a god. Historically, the idea of the hierarchical order of reality (“Great Chain of Being”) is a long-standing one (Lovejoy, 1936). It traces back to Plato, Aristotle, and Plotinus and other neo-Platonists. Kleineberg (2017) also argues that similar ideas are included in Hinduism, Judaism, Buddhism, Taoism, and Islam, thus implying that this notion could be almost universal in cultures (cf. Wilber, 2001).

Hierarchy is defined as a chain of growing stages or phases where each new phase is linked to and built upon past or existing lower stages. Hierarchical development theories assume that there are developmental phases organised in a certain way, so that they cannot be crossed, and that the change in these chains has only one direction. This line of thinking, i.e., based on vertical developmental phases, always includes a normative, value-based assumption. Instead, in the horizontal change the developmental phases can be consecutive and they can exist without the assumption about an internal hierarchy. However, this does not exclude the possibility for successfully reviewing a previous phase so as to enable new development for the next one (Alexander & Langer, 1990).

One example of how world-view is implicitly rooted in our thinking of change comes from the history of sciences. Psychological, qualitative changes during the lifespan are not something only modern scholars have been interested in. For example, several classifications of the human lifespan were presented in *Tetrabiblos*, one of the major books in Western world before the Scientific Revolution (Ptolemy, trans. 1940). Ptolemy considered four and seven phases of the lifespan, referred to as the “Ages of Man”, each having their own qualitative psychological features. The lifespan was understood as analogical to the four seasons: childhood, adolescence, adulthood, and old age. The seven phases were connected to the ancient cosmological system, as the phases were “governed” by each of the known seven planets according to the microcosm – macrocosm analogy

(“as above so below”) (Burrow, 1986; Sears, 1986). The starting point was holism: the lifespan of an individual (microcosm) reflected a broader reality (macrocosm), which were analogically connected in terms of their rhythm. It was a dogma based on equivalence, sympathy and correspondence. According to this dogma, a part reflects the entity: life on Earth was a reflection of a larger unity, the highest environmental system, the cosmos (Burrow, 1986).

The beginning of *adulthood* can be defined in different ways. For example, it can be considered juridically as a formal shift to majority, i.e., attainment of full legal age (Robinson, 2013). Based on the age defined in years, adulthood can be divided in different ways into several stages, for instance, ranging from 20-year-olds (young adults) to adults, middle-aged, and late-middle-aged people, up to the final stages of old age (Cavanaugh & Blanchard-Fields, 2014). Another, more sociological classification divides the lifespan into the first, second, third, and fourth age (Laslett, 1994; cf. also Settersten, 2003). In this work, the discussion on adulthood is mainly targeted at the stages between early adulthood and the late middle age, or in Laslett’s terms, the second age, but also with some references to the third age as well.

The Development of Adult Thinking: Starting Points for Modern Research

Piaget, Perry; Kohlberg, Gilligan and the Development of Thinking: Logic, Knowledge and Morals

Piaget’s (1896–1980) theory concerning cognitive development in childhood and adolescence is still an important theory in developmental psychology. This theory has been expanded to the post-Piagetian direction with new openings and influencing several later research trends. Piaget (who was a biologist) defined his research interest as the highest form of biological adaptation, scientific thinking, and he called his project “genetic epistemology”. It includes several different areas, such as the formation of sociological and psychological knowledge, the development of logic and moral thinking, and the emergence of visual thinking plus metacognition (Beilin, 1992; Piaget & Inhelder, 1969).

An essential part of Piaget's theory concerns scientific thinking, more specifically the development of *causal thinking*. Here, causality refers to the relationship between the cause (x) and effect (y), where $x \Rightarrow y$, in terms of time. The theory describes the basic features of scientific thinking: how we perceive the phenomena of physical object reality and the causal relationships between them. This also defines the best-known part of Piaget's theory, the developmental stage theory. Causal thinking can also be described with terms such as logical reasoning, or hypothetico-deductive thinking (Piaget & Inhelder, 1969; Inhelder & Piaget, 1958; see also Barrouillet & Gauffroy, 2013).

Piaget's entire theory is focused on studying how knowing is possible and how it reflects the (assumed) *general, universal development of humankind* (Piaget, Garcia, Garcia, & Lara, 1989). Thus, it does not only concern individual development but also depicts how it has become possible for the humans to realise scientific knowledge with different developmental stages; from magical thinking towards scientific-rational thinking (cf. also Dux, 2011).

According to Piaget, the development of logical thinking is about a constant change or process – causal knowledge is under continuous construction within an assimilation and accommodation process. His developmental theory includes four main stages. During childhood, interaction with the material environment is a prerequisite for later internalised reasoning. External action enables the creation of sensorimotor schemas as behavioural patterns. Schemas are internalised and later emerged at the stage of concrete thinking, logical operations based on direct observations appear approximately at the age of 7. Formal thinking is the highest form of causal understanding emerging at the beginning of puberty: based on hypothetico-deductive, abstract thinking but still open to experimental testing. It is possible to isolate, combine, and control the variables in well-defined problem-solving situations (see Table 2.1; see also Kallio, 1998, pp. 16–20; Piaget & Inhelder, 1969; Inhelder & Piaget, 1958).

Cognitive development stages and chronological age	Abilities for logical thinking
Sensorimotor stage (0–2 years)	The sensorimotor stage covers the first phases of cognitive development in early childhood: understanding the connections between movements and consequences, a grasp of elementary

Preoperational stage (2–7 years)	causal relationships and object permanence. For cognitive development, also the initial stages of linguistic development are essential. In the preoperational stage the child starts to understand that words and concepts refer to certain objects (symbolic function). Thinking is egocentric. However, already at this stage the environment is very important for the child’s cognitive development. In the sensorimotor and preoperational stages the child still lacks abilities for internalised logical operations.
Concrete operational stage (c. 7–11/12 years)	During the concrete operational stage, logicity in thinking increases and thus enables operations of logical thinking. However, thinking is still bound to concrete situations and abstract concepts are difficult, which for its part limits the child’s thinking. For example, the sense of time and understanding of distances becomes easier. Thinking develops so that the child can at least partly see things also from the viewpoint of others instead of highlighting solely the perspective of one’s own.
Formal operational stage (from c. 11/12 years onwards)	Abstract thinking is enabled so that thinking is no longer restricted to concrete things. Abilities for the mastery of logical mental operations (isolation and control of variables, creation and use of formal models and logical reasoning) are developing. The formal operational stage also includes abilities for comparing different hypotheses and for deductive reasoning. Theories can be used as cognitive tools.

Table 2.1

Cognitive development stages and the development of logical thinking according to Piaget’s theory. Printed with permission. Copyright by the Finnish Educational Research Association.

As regards adult cognitive development, the assumptions of “Piagetian-like” universal fixed stages comply with the following criteria: 1) the unchangeable order of the stages, which means that their development always follows a certain order; 2) each stage consists of a qualitatively unique structure, the internal and mental structure; 3) the integration of lower developmental stages with a higher one, the later stages build on and incorporate the lower stages as part of new development; 4) the stages include different sub-stages, during which the change becomes stabilised; 5) the state of balance where the features of the stage are established (Brainerd, 1978; Marchand, 2001).

Piaget’s theory was interpreted in its heyday in a way that it comprehends the development of thinking in all domains. In this form, causal thinking could be applied in any field, from physical

object reality to processes of emotional and social life. Nevertheless, not all researchers, including later Piaget himself, accepted this claim at face value, which led to new developments in theory formation. The assumption that any object or topic could be studied with causal reasoning has been seen as one form of reductionism: any action could be interpreted with formal language (Kincheloe & Steinberg, 1993).

Regarding formal thinking, it is possible to formulate various hypotheses. At first, Piaget assumed that it is a general stage of thinking, and in terms of *scientific thinking* it can develop towards higher and higher levels (Inhelder & Piaget, 1958). Later, as the notion of generality was rejected, Piaget assumed in his work that formal thinking only emerges in the specific areas of work, hobbies etc. that the individual is specialised in and motivated for (Piaget, 1972). Still, in the light of empirical results it is obvious that formal operational thinking is not a universal developmental stage, not even in highly developed economies and cultures (see Chapter 3 for recent results regarding Finnish students; see also Kallio, 1998 for similar results; Barrouillet & Gauffroy, 2013). A third hypothesis, proposed by Lourenço (2016) presumes that it is possible to integrate formal thinking into a larger cognitive system. Further, he also argues that formal thinking as such is not an obstacle for, neither incompatible with the development of some other areas of the psyche (for example, in association with emotional and socio-cognitive development). Lourenço's notions come surprisingly close to those of postformal thinking, though *without assuming a new stage* after formal thinking.

The critique on Piaget's views can be considered a turning point in the study of adult thinking. The observations that formal thinking is not a universal developmental stage (Barrouillet & Gauffroy, 2013), as well as Perry's (1913–1998) research on the development of university students' thinking and ethical reasoning were significant in this respect (Perry, 1999). Perry was the first one to study the development of adult cognition from different perspectives instead of that of logical reasoning only. In the Piagetian tradition, reasoning is always mechanical-logical and closed, based on dichotomic truth values: an answer is always either right or wrong. According to Wu and Chiou (2008), closed systems are based on a limited number of variables, while other contextual aspects of the problem are irrelevant to the solution. There is a single right answer and it can be applied to all similar circumstances.

In his research on the development of thinking Perry focused on *epistemic assumptions regarding knowledge and how these are justified*. He discovered that university students' perceptions of knowledge changed qualitatively as their studies progressed; from unquestioned thinking at the beginning of the studies towards relativity in the middle of the studies, and finally towards independent evaluation and formation of opinions. The research trend starting from Perry has been very strong throughout the past decades (see Chapters 3, 4 and 11 in this edition).

Perry's major innovation was the triangle of three thinking modes: dualism, relativism and evaluative thinking. It includes the following notions: firstly, in epistemological dualism knowledge is perceived as consisted of either-or, absolute-like truths, without doubting the premises and argumentation. Secondly, epistemological relativism takes into account different viewpoints enabling differing but equally valid assumptions. And thirdly, evaluative thinking is characterised by independent and critical evaluation of different viewpoints, and forming a subjective conclusion or synthesis of them.

Development stage theories for moral thinking mainly stem from Kohlberg's (1927–1987) and Gilligan's (1936–) work. Kohlberg's theory was inspired by Piaget's studies. Hence, it includes a progression of universal and hierarchical moral-ethical reasoning stages. Gilligan's theory, in turn, can be seen as a counter-reaction to Kohlberg's notions. In addition to rational reasoning, her theory takes into account the expansion of social points of view in the development of moral thinking.

Kohlberg emphasises the rationality of moral reasoning and its relational independence from feelings. Altogether six stages pertaining to moral reasoning have been suggested based on socio-moral viewpoints and also what an individual considers right and correct as opposed to wrong and incorrect action. A higher development stage is guided by a comprehensive desire towards commonly and coherently abiding ethical principles. Kohlberg's theory has been challenged most significantly by Gilligan (1993). She points out that the ethics of justice based on rationality describes the way of handling moral dilemmas mainly from a male perspective. In moral thinking, her focus is on human relationships, care, and responsibility. At the lowest stage the moral of caring

is self-centred, whereas at the highest stage it reflects the idea of individuals' mutual dependency, i.e., caring for oneself and others (see Chapter 5).

Postformal and Relativistic-dialectical Thinking in Adulthood

We can distinguish between three major lines of research into adult cognitive development. So-called derivative models originate from Perry's (1999) model and focus on the study of *epistemological assumptions*; they do not link their theorisation to formal thinking as such (see Chapters 3 and 4; Moshman, 2013). Another school has evolved around *context-free complexity models*, which are designed as to be applicable to any domain. The third trend, which emerged in the 1980s and is perhaps most significantly present in this chapter as well, assumes a new stage called *postformal* or *relativistic-dialectical* or *dialectical thinking*.

Regarding the second tradition, some scholars, like Kurt Fischer (Wozniak & Fischer, 1993) and Michael Commons (Commons & Kjørlien, 2016), have created context-free and domain-independent constructs (as alternatives to Piaget). These models are described here only briefly. A unifying principle in the respective models by Commons and Fischer is that development to higher levels is indicated by increasing complexity of tasks and performance in them. The Mathematical model of Hierarchical Complexity (MHC) presented by Michael Commons is gaining ground in scientific research. Currently there are altogether 15, even 16, different stages in this model. It is a model where understanding of task complexity is used to define the individual developmental stage of the problem-solver (Commons & Kjørlien, 2016). Kurt Fischer's Dynamic Skill Theory (DST), in turn, assesses the increasing complexity of skills (Wozniak & Fischer, 1993). The model starts from the organisation of action towards higher stages, up to stage 13. Both models are intended to serve as a comprehensive model which could be used to define any action meeting certain criteria of a developmental stage. In lower stages, a child is only capable of coordinating certain factors, but in the more developed stages it is possible to connect different structures that already have internally linked components. Both models for complex actions are hierarchical: Each developmental stage requires and is always built on top of the previous one.

As mentioned, the third school or trend is the most important one in our context. Despite the fact that empirical results on the mastery of formal thinking did not support Piaget's original idea of this being a universal stage attainable to everybody, researchers began to speculate whether there could be an entirely new developmental stage after it. Most of these scholars detached themselves from the research on pure causal thinking, and included notions of relativism and evaluative cognitive components in their models. Most importantly, they also included other than cognitive factors into their models. Thus, cognitive development is integrated into the development of other contexts. Therefore, thinking cannot be studied distinct from other processes and domains, such as those comprising emotional (Labouvie-Vief, 2015), autonomy of self (Edelstein & Noam, 1982), socio-cultural (Kincheloe & Steinberg, 1993), system theory (Sinnott, 1998), or even religious and spiritual elements or higher states of consciousness (e.g., Wilber, 2001; Kamppinen & Jakonen, 2015; Alexander & Langer, 1990; Perttula & Kallio, 1996). By the same token, another important field of study deals with dialectical thinking, understood as the ability to reconcile contradictory viewpoints to reach a synthesis (Basseches, 1984).

Conceptually, the presented models of postformal or relativistic-dialectical thinking include similar characteristics as noted by various scholars (Kallio, 1998; Kramer, 1983; Marchand, 2001; Gurba, 2005). Postformal thinking is supposed to overcome the limitations of formal logic with multiple logics, and widen the boundaries of thinking to a more sophisticated and nuanced direction. Marchand (2001) distinguishes between 'hard logic' vs. 'flexible logic', the first referring to dualistic true/false logic, and the latter to subjective, open, arbitrary and contextual logic. Thus, flexible logic includes affective, systemic and holistic understanding, instead of just linear-causal knowledge. For example, Labouvie-Vief (2015) traces her model back to Carl Jung (1991) and his idea of the integration of rational vs. irrational spheres of psyche, as in the individuation process in adulthood.

According to Kramer (1983), these models follow more or less the progression from absolutism to relativism and dialectical thinking (even if the models have more than three stages or levels). The first of these is considered a stage of development taking place in youth, and the latter ones in adulthood. The lowest level, *absolutistic* thinking is understood as parallel to formal thinking. Thus, absolutistic thinking ends up with true-untrue statements in closed systems. In contrast, the following notions about knowledge are typical of *relativistic-dialectical* thinking: realising the non-absolute

nature of knowledge (relativism); accepting that there are contradictions in knowledge; and integrating contradiction into a totality (dialectical thinking). However, mature thinkers also recognise that any resolution or established conception will be challenged by new data, results and theoretical analyses; i.e., knowing is an open and constant process (Kramer, 1983). Thinking becomes thus flexible, complex, contextualised and integrated in adulthood. The diverse, relative reality calls for an autonomous pluralistic synthesis (Kallio, 2001).

Contextual Integrative Thinking as a Form of Adult Thinking and a Component of Wisdom

Ontological Pre-understanding and Adult Thinking

The theorisation around postformal or relativistic-dialectical thinking encompasses implicit beliefs, which so far have not been properly analysed theoretically (with the possible exception of Kramer, 1983 and Kincheloe & Steinberg, 1993). According to the post-Piagetian scholars, the context of thinking must always be taken into account, like also problem identification, i.e., the type of problem or situation in question. Thus, focusing solely on logical thinking is inappropriate, as it is obvious that not everything can be solved by logical inferencing. As for the capacity of formal thinking, it would suggest that adults are capable of implicit *hermeneutical preunderstanding* regarding the *domain* in which their thinking processes are applied. However, this point is rarely, if ever, stated explicitly in theoretical discussion.

Hermeneutics (from Latin '*hermeneutica*', Palmer, 1969) refers here generally to theories of interpretation and understanding. We are hermeneutically situated: our understanding and knowledge formation occurs within a particular horizon, but at the same time, it is under constant and ongoing construction (Malpas, 2018; Gadamer, 2008; Peters, 2007). Adult thinking does not take place in a cultural or contextual vacuum but rather within a diverse community of paradigms and values. It is based on historically, economically and ideologically conditioned phenomena. Tradition serves as a base and condition to any knowledge formation, and is present and underlying both scientific inquiry and everyday thinking. These hermeneutical conceptions are mostly tacit, hidden and not openly discussed, if even recognised (Kincheloe & Steinberg, 1993).

Neo-Piagetian scholars seem to criticise basically a philosophical ontological problem behind Piaget's notions. Causal scientific thinking focuses ontologically on *physical object reality*, but generalisation beyond this domain is questionable. It might be absurd to use hypothetico-deductive logic so as to understand, for instance, an emotional conflict between partners, where both of them are involved in a complicated situation. Which features of the situation/object need to be taken into account and prioritised, and which not? Is the chosen approach, way of thinking and action, appropriate and relevant regarding the situation? All this refers to increasing sensitivity to situational properties, i.e., denoting context-sensitive and content-wise thinking.

Another important issue with regard to Piaget's theory has been raised in current scientific discussion. Formal and postformal thinking have also to do with so-called well- and ill-defined problems (Schraw, Dunkle, & Bendixen, 1995). In studying formal thinking in the light of Piaget's Pendulum problem, we are dealing with a well-defined problem (see Chapter 3). The subjects are provided with choices where it is clear in advance which factors they need to use when solving the problem, and there is only one correct solution. By contrast, if the problem is defined in a way that the conditions are not clear enough, the outcome cannot be straightforward either: Problems of this kind are called ill-defined problems (e.g., Chi, Glaser, & Farr, 2014, for more about this kind of problems, see e.g., Chapter 4).

Georg Henrik von Wright (2004) has argued that there is a definitive ontological difference in the way knowledge is constructed in the respective domains of natural and human sciences: Natural sciences seek to explain *why and how things happen* in the natural world, whereas human sciences seek for practical *understanding* of human actions and behaviour. Von Wright argues against a causal theory of human action: behaviour can be understood only by referring to the intentionality of humans; "Things move, persons act" (Kenneth Burke, according to Henderson and Williams, 2001, p. 164). Any social action is tied in the persons' hermeneutical understanding of implicit social rules and situation-specific characteristics. In conclusion, it seems that the Piagetian and neo-Piagetian scholars have different ontological premises and hermeneutical preunderstandings of how human action should be understood. Causality cannot exhaustively explain human action (see also Mascolo

& Kallio, 2019, Mascolo & Kallio, in press). Moreover, human action cannot be understood in terms of the machine paradigm, since human mind is constantly creating new internal and external meanings of reality based on one's experiences, agency and plasticity (Kohler, 2010; Teo, 2010).

I have already earlier re-labelled adult thinking as integrative thinking (Kallio, 2011) arguing that the terms “postformal” and “relativistic-dialectical” thinking should be replaced with integrative thinking. The position of postformal thinking as a new developmental stage has not been confirmed, and there is always a risk of confusion when using philosophical terms in psychological research (see Chapter 13). Absolutism can be understood as single-perspective thinking and relativism as multiperspective thinking (Figure 2.1). Moreover, the term ‘postformal’ may be misleading if it is understood as a developmental stage in the original Piagetian sense: the same criterion for ‘stage’ is not applicable to both formal and postformal thinking (Kallio, 2011). Hence, I suggest here that ‘*contextual integrative thinking*’ or just ‘*integrative thinking*’ (Kallio, 2011) could replace the terms postformal and relativistic-dialectical thinking in the theorisation of adult cognitive development.

Contextual understanding seems to be one of the necessary conditions in adult knowledge formation. This understanding is about tacit hermeneutical, ontological pre-understanding of human action differing from the perception of physical objects. It has to be noted, however, that the mentioned three modes of thinking are not necessarily manifested as if in a developmental, normative hierarchical interrelationship. They can also be understood as different cognitive modes to be used in different contexts depending on the ontology of the object or situation at hand. It may be so that single-perspective thinking is preferable in some occasions, like with natural scientific problem solving in line with the Piagetian tasks, while other modes may suit better to some other settings or the different modes can also be of equal value in some cases. Thus, these modes can be equally useful and appropriate, but used selectively depending on the purpose and domain concerned (see also Figure 2.2).

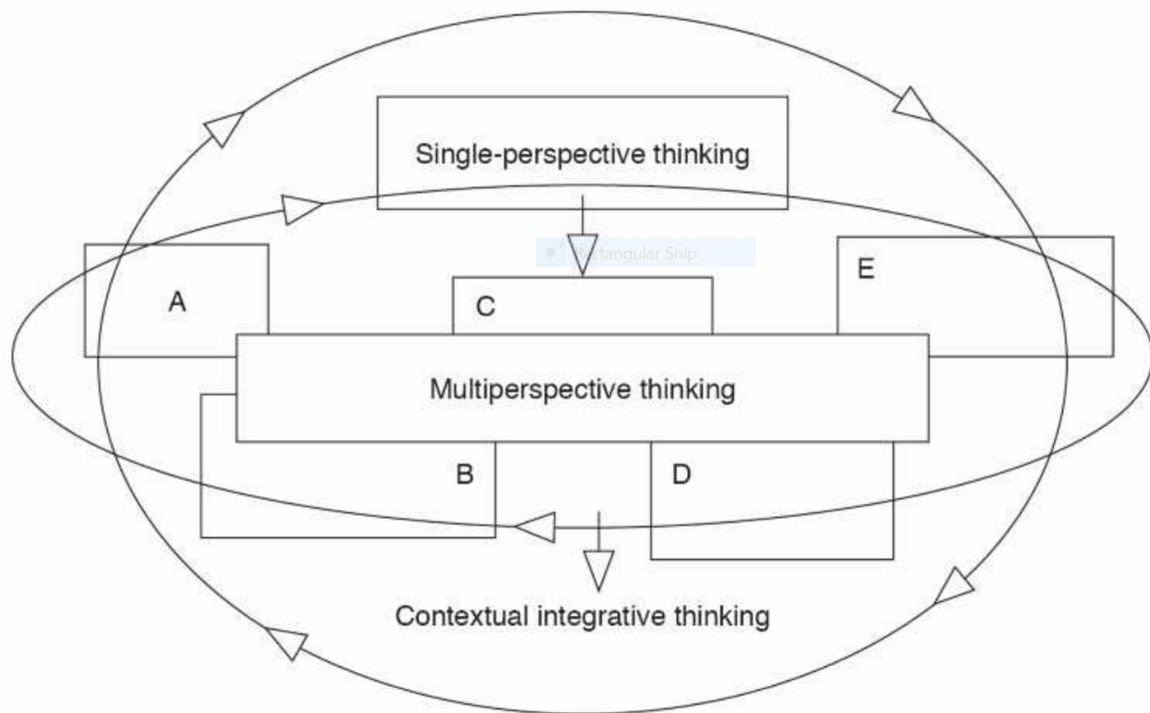


Figure 2.1. Development of contextual integrative thinking: three stages or different modes of thinking. (Markings A thru D refer to different perspectives.) Printed with permission. Copyright The Finnish Educational Research Association.

According to some sources, the first known use of the term 'integration' dates back to 1620 (Integrate, 2019). Oxford Lexico tells that the term derives from the "Mid-17th century from Latin *integrat-* 'made whole', from the verb *integrare*, from *integer* 'whole' (see *integer*)..." (Integration 2019).

Alexander and Langer (1990, p. 27) define integrative thinking as follows: 'Integration (is) ... a synthetic form of thinking ... that integrates several opposing systems into an abstract whole (and) contains all particulars'. In general, integration does not mean simply connecting, uniting or linking things together. It is about fusing or merging components together, which is more than just assembling things mechanically together.

In the field of cognitive sciences, there are several close concepts to be pondered in comparison to integrative thinking, however. *Integrative complexity* is one possible candidate in this respect. It has

been used at least by Suedfeld and Leighton (2002). As a psychometrically validated concept, it was originally introduced both as a personality trait and a cognitive style, but nowadays it is understood rather as a situation-dependent pattern (see also Chapter 6). *Evaluative integrative thinking* seems to refer to the integration of positive and negative self-concepts (Showers, 1992). In both of these concepts, both differentiation (knowledge along different attributes), and then integrating the knowledge to more complex structures are in the core of construct (Showers, 1992).

Also *holistic thinking* is a close term to integrative thinking as opposed to analytical thinking. In holistic thinking the relationships and the wholeness are of primary importance instead of isolated things or objects. Holism implies that no phenomenon can be understood by reducing it to smaller units but only as an integrated whole. Holism vs. analytic cognition refers closely to field independence vs. dependency, i.e., the ability to focus attention either on a larger field or the parts thereof (Choi, Koo, & Choi, 2007). As the mentioned terms (integrative complexity/evaluative integrative/holistic thinking) are set phrases pertaining either to personality- or general cognitive psychology, it is suggested that the use of term ‘contextual integrative thinking’ be limited to refer to the domain of adult cognitive development.

Contextual Integrative Thinking and Wisdom Research

Wisdom research is currently in the midst of obvious pluralism as there are already dozens of existing models and new ones are constantly created. In the light of the long historical, cultural, religious and spiritual traditions tracing back thousands of years, it is evident that wisdom is an elusive concept to define. Here it may be sufficient to define it shortly *as an ideal goal of human development* (Swartwood & Tiberius, 2019, p. 20), and “*value term embedded in cultural context*” (Assmann, 1994, p. 187). Despite or perhaps just because of its elusive nature, wisdom has definitely fascinated people in all cultures at all times and the concept is now living its Renaissance in various scientific disciplines, especially in psychology (Sternberg & Glück, 2019; see also Chapter 10). Wisdom is a phenomenon that has interested researchers in both pre-modern and modern psychology. The concept has a philosophical-theological background related to the cultural wisdom traditions of the East and the West. Wisdom research basically and necessarily calls for connections to various other fields of study besides psychology, such as comparative religion, history of

philosophy, cross-cultural studies and esotericism research (Curnow, 1999, 2015; Assmann, 1994; Helskog, 2019; Walsh, 2015).

Wisdom is intimately linked to adult development, as wisdom is seen as the highest developmental goal and prospect of human progress (Erikson & Erikson, 1998). Significant research into these connections is going on in different domains (see Sternberg & Glück, 2019).

Wisdom research is nowadays highly heterogeneous as diverse models, classifications and tasks are constantly created. These conceptualisations of psychological wisdom research could perhaps be integrated to constitute a kind of “*Wisdom as an Ideal Goal*” model, linking together various domains of psychological and developmental psychological research, such as those pertaining to neuropsychology, personality, cognitive functions, emotions, morals and values, spirituality and religious thinking. Such an integrative approach could be most appropriate in analysing the basic psychological mechanisms and processes that underlie wisdom. Drawing on research results from different fields and taking ‘ideal goal of human development’ as an umbrella term could also be the easiest way to reach a comprehensive definition of wisdom. Each culture seems to have human ideals of this kind, even if the content may vary (e.g., Western vs. Eastern differences between cognitive vs. affective domains of wisdom Takahashi & Bordia, 2000; Assmann, 1994).

In the following I focus on the relationship between wisdom and adult cognitive development. The close connection between postformal or relativistic-dialectical thinking and wisdom has been pointed out by many scholars. In scholarly discussion, postformal and relativistic-dialectical thinking are used interchangeably as a subcomponent of wisdom (Baltes and Staudinger, 2000; Compton & Hoffman, 2013; Kramer, 2003; Arlin, 1991; Bassett, 2005; Staudinger & Glück, 2011; Kunzmann, 2004; Asadi, Khorshidi, & Glück, 2019; Płóciennik, 2018; Gidley, 2016; Yang, 2008; Grossman, 2017; Kallio, 2015, 2016b; Smith, 2019).

Earlier in this chapter adult cognitive development has been defined in terms of multiperspective and contextual integrative thinking. In multiperspective thinking, a wise person reflects deeply on

different viewpoints and weighs them carefully. Multiperspective thinking means the ability to abandon egocentric orientation so as to distance oneself in a problematic situation and consider it from different perspectives. Looking at things from multiple perspectives brings intellectual humility, as one realises that there might be no straightforward one solution to problems. It also makes possible to understand the relativity of viewpoints and the context- and situation-dependency of problems, implying also uncertainty of knowledge (e.g., Grossmann, 2017).

As Staudinger and Glück (2011) state, wisdom can be regarded as a skill to integrate necessary factors of existence that contradict with each other. Thus, one is able to understand and connect e.g., moral good and evil, dependency and independency, doubt and certainty, control and chaos, limitedness and infinity, and selfishness and unselfishness. In doing so, one can also integrate motivation, emotion, and thinking. The fusion of rationality and intuition is possible as enabled by flexible logic (Sternberg, 2013). Grossmann (2017, p. 235) and his colleagues have defined wise thinking as “intellectual humility or recognition of limits of own knowledge, appreciation of perspectives broader than the issue at hand, sensitivity to the possibility of change in social relations, and compromise or integration of different opinions”.

Figure 2.2 summarises the main views discussed in this chapter. The original key concept of this chapter, adult cognitive development, is rephrased as contextual integrative thinking (i.e., “postformal”/“relativistic-dialectical thinking”). It has direct links to different theoretical traditions, from Piaget’s theory to Perry and Kohlberg, and it also has links to more humanistic psychological models (see e.g., Misiak & Sexton, 1973), like those exemplified by Jung and Ken Wilber. All these models have focused on particular psychological domains, like Piaget’s theory on manipulation of physical objects. Also learning research discussed in this edition is included in the Figure – as, for example, theorisation of tacit and expert knowledge have direct links to wisdom research (Sternberg, 2013; Baltes & Staudinger, 2000; see Chapters 9 and 10). Different ontological preunderstandings and related assumptions are also included in Figure 2.2, indicating adult understanding of qualitative differences in reality.

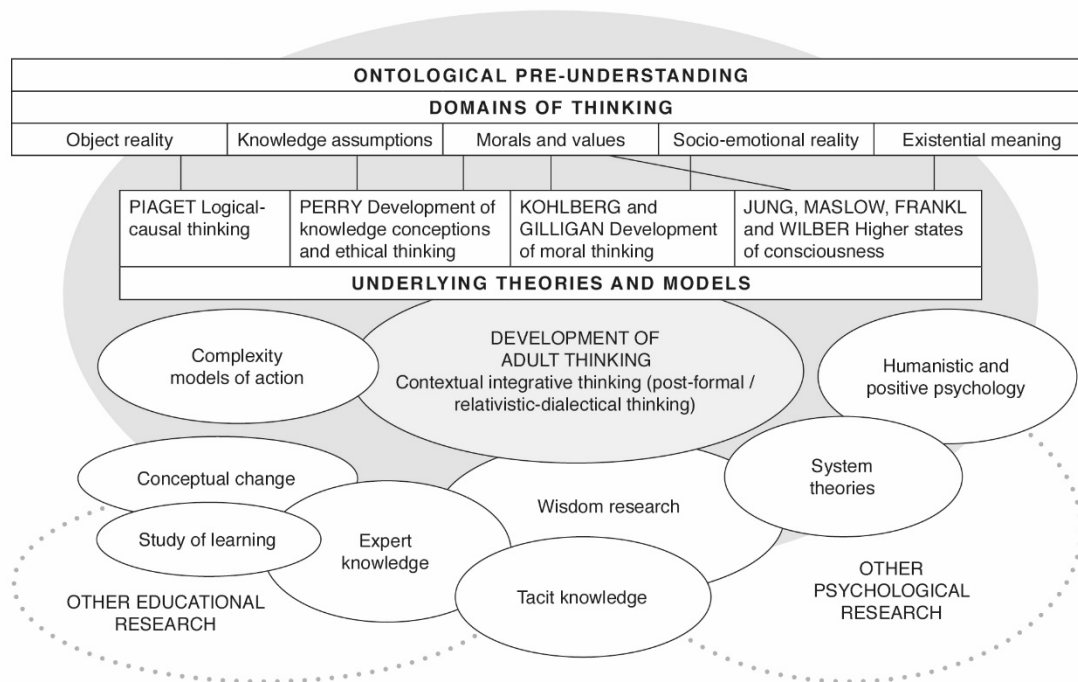


Figure 2.2. Main research traditions regarding the development of adult thinking, their connections to other close fields of research and related ontological pre-assumptions for different domains of thinking.

Conclusions

This chapter has discussed and explicated some philosophical assumptions regarding the basic developmental psychological concepts, like what is change (as assumed both in psychological development and learning theories). Similarly, using hermeneutical pre-understanding as a conceptual tool, it was argued that terms like formal and postformal thinking include different ontological assumptions regarding the object reality humans are acting on. The basic intention has thus been “to dig into the roots” of the concepts used in current discussion. Elaborating on Kramer’s (1983) statement that the fundamental difference between formal and postformal theorisations is based on different world-views, it is argued here that perhaps more specifically it is a question of different ontological positions within the world-views.

Secondly and along the same lines, a new term is suggested to be used to describe adult cognitive development: contextual integrative thinking. Certain distance is thus taken regarding the current discussion on Piaget's theory and also from the neo-Piagetian models. It is worth noting, however, that as a concept adult cognitive development in terms of contextual integrative thinking is broader than just epistemic or epistemological development (see Chapters 3 and 4), as this kind of integration embraces not only knowledge assumptions but also entirely different domains and fields, like emotions, volition, social processes, existential meanings and other contexts.

The field of adult cognitive research is in an interesting state; it is simultaneously fragmented but also convergent. We are not dealing with a monolithic common structure here, but a phenomenon that at the moment seems multidimensional and reaches towards many directions. It is fragmented if we think of the number of models and the imaginative power of the scholars working in the field, considering how they have labelled all the various new stages and phenomena of development. This could easily create an impression of conceptual confusion. Although the models are abundant, they all aim at outlining this same phenomenon: in many cases only the conceptual expressions differ from each other.

Adult integrative thinking seems to require an understanding of the multiplicity and plurality of viewpoints, opinions, explanations and domains and also, on the other hand, attempts at reconciling this multiplicity by an integrative approach. It is disputable, however, how justifiable it is to talk about adult integrative thinking as a qualitative category or stage of its own. It is namely possible to argue that integrative thinking develops or progresses from youth to adulthood and up to old age. Thus, it might comprise a continual, gradual progression or a "lifespan learning curve" of integration, with its peak in adulthood and older age – a tempting topic for further research also with respect to wisdom.

This book discusses several interconnected, closely linked domains of adult cognitive development and learning. The book has been edited with a particular observation in mind: scholars from different fields discuss various phenomena which seem to have, at least implicitly, resemblances and features

in common across different domains. Hence, we can find analogies or Wittgensteinian “family resemblances” (Wennerberg, 1967) between different traditions pertaining to developmental psychology, learning and wisdom research. For example, discussion about neo-Piagetian concepts like adult integrative thinking, and on the other hand, in research concerning the development of expertise, can feature largely similar arguments (see Chapter 10). Some system theories have obvious links to adult cognitive development theorisation as well (Chapter 12). Further, also the study of wisdom seems to have some overlapping features and common elements with both adult development and learning research.

The articles written for this edition are selected with the criterion that they give, at least partly, a multidimensional and thereby a holistic view on the complex phenomena. It is understandable however, that the book concentrates on some major theoretical constructs only, given the limited space and also the fact that all authors of this book share the same national background (Kallio, 2016b), which may be considered a limitation in the global perspective. Further discussion and debate are thus necessary in the future.

References

- Alexander, C. N., & Langer, E. J. (Eds.). (1990). *Higher stages of human development: Perspectives on adult growth*. New York, NY: Oxford University Press.
- Arlin, P. K. (1993). Wisdom and expertise in teaching: An integration of perspectives. *Learning and Individual Differences, (5)4*, 341–349. doi:10.1016/1041-6080(93)90017-M
- Asadi, S., Khorshidi, R., & Glück, J. (2019). Iranian children's knowledge about wisdom. *Cognitive Development, 52*, 100814. doi:10.1016/j.cogdev.2019.100814
- Assmann, A. (1994). Wholesome knowledge: Concepts of wisdom in a historical and cross-cultural perspective. In D. L. Featherman, R. M. Lerner, & M. Perlmutter (Eds.), *Life-span development and behavior* (Vol. 12, pp. 187–224). Hillsdale, NJ: Erlbaum.
- Baltes, P. B., & Staudinger, U. M. (2000). Wisdom: A metaheuristic (pragmatic) to orchestrate mind and virtue toward excellence. *American Psychologist, 55*(1), 122–136.
- Barrouillet, P., & Gauffroy, C. (Eds.). (2013). *The development of thinking and reasoning*. London, England: Psychology Press.
- Basseches, M. (1984). Dialectical thinking and adult development (Publications for the advancement of theory and history in psychology No. 3). Norwood, NJ: Ablex.
- Bassett, C. (2005). Wisdom in three acts: Using transformative learning to teach for wisdom. In D. Vlosak, G. Kielbaso, & J. Radford (Eds.), *Appreciating the best of what is: Envisioning what could be: The Proceedings of The Sixth International Conference On Transformative Learning* (pp. 29–34). East Lansing, MI: Michigan State University & Grand Rapids Community College.
- Becker, K. (2005). Individual and organisational unlearning: directions for future research. *International Journal of Organisational Behaviour, 9*(7), 659–670.
- Beilin, H. (1992). Piaget's enduring contribution to developmental psychology. *Developmental psychology, 28*(2), 191–204.

Brainerd, C. J. (1978). *Piaget's theory of intelligence*. Englewood Cliff, NJ: Prentice Hall.

Burrow, J. A. (1986). *The ages of man: A study in medieval writing and thought*. Oxford, England: Clarendon Press.

Cavanaugh, J. C., & Blanchard-Fields, F. (2014). *Adult development and aging* (7th ed.). Belmont, CA: Cengage Learning.

Chi, M. T. H., Glaser, R., & Farr, M. J. (Eds.). (2014). *The nature of expertise*. New York, NY: Psychology Press. doi:10.4324/9781315799681 2014

Choi, I., Koo, M., & Choi, J. A. (2007). Individual differences in analytic versus holistic thinking. *Personality and Social Psychology Bulletin*, 33(5), 691–705.

Commons, M. L., & Kjørlien, O. A. (2016). The meta-cross-paradigmatic order and stage 16. *Behavioral Development Bulletin*, 21(2), 154–164.

Compton, W. C., & Hoffman, E. (2013). *Positive psychology: The science of happiness and flourishing* (2nd ed.). Belmont, CA: Wadsworth, Cengage Learning.

Cognition. (2019a). In *Lexico*. Powered by Oxford. Retrieved from <https://www.lexico.com/en/definition/cognition>

Cognition. (2019b). In *Online Etymology Dictionary*. Retrieved from <https://www.etymonline.com/word/cognition>

Curnow, T. (1999). *Wisdom, intuition and ethics* (Avebury series in philosophy). Aldershot, England: Ashgate.

Curnow, T. (2015). *Wisdom: A history*. London, England: Reaktion Books.

Develop. (2019). In *Lexico*. Powered by Oxford. Retrieved from <https://www.lexico.com/en/definition/develop>

- Dux, G. (2011). *Historico-genetic theory of culture: On the processual logic of cultural change* (N. Solomon, Trans.) (Sociology). Bielefeld, Germany: Transcript.
- Edelstein, W., & Noam, G. (1982). Regulatory structures of the self and the 'postformal' stages in adulthood. *Human Development*, 25(6), 407–422.
- Erikson, E. H. (Ed.). (1978). *Adulthood*. New York, NY: Norton.
- Erikson, E. H., & Erikson, J. M. (1998). *The life cycle completed (Extended version)*. New York, NY: WW Norton & Company.
- Freud, S. (1989). *The psychopathology of everyday life* (J. Strachey Ed. & Trans.) (Standard edition). New York, NY: Norton.
- Gadamer, H.-G. (2008). *Philosophical hermeneutics* (D. E. Linge, Ed. & Trans.) (2nd ed.). Berkeley, CA: University of California Press.
- Gidley, J. M. (2016). *Postformal education: A philosophy for complex futures* (Critical studies of education, Vol. 3). Cham, Switzerland: Springer.
- Gilligan, C. (1993). *In a different voice: Psychological theory and women's development*. Cambridge, MA: Harvard University Press.
- Grossmann, I. (2017). Wisdom in context. *Perspectives on Psychological Science*, 12(2), 233–257.
- Gurba, E. (2005). On the specific character of adult thought: Controversies over post-formal operations. *Polish Psychological Bulletin*, 36(3), 175–185.
- Helskog, G. H. (2019). *Philosophising the dialogos way towards wisdom in education: Between critical thinking and spiritual contemplation*. London, England: Routledge.
- Henderson, G., & Williams, D. C. (Eds.). (2001). *Unending conversations: New writings by and about Kenneth Burke* (Rhetorical philosophy and theory). Carbondale, IL: Southern Illinois University Press.

Hoare, C. (Ed.). (2011). *The Oxford handbook of reciprocal adult development and learning* (2nd ed.) New York, NY: Oxford University Press.

Hussey, T. (2002). Thinking about change. *Nursing Philosophy*, 3(2), 104–113. Modified version 2009, retrieved from <https://onlinelibrary.wiley.com/doi/full/10.1046/j.1466-769X.2002.00096.x>

Illeris, K. (Ed.). (2009). *Contemporary theories of learning: Learning theorists ... in their own words*. London, England: Routledge.

Inhelder, B., & Piaget, J. (1958). *The growth of logical thinking from childhood to adolescence: An essay on the construction of formal operational structures* (A. Parsons & S. Milgram, Trans.). New York, NY: Basic Books.

Integrate. (2019). In *Lexico*. Powered by Oxford. Retrieved from <https://www.lexico.com/en/definition/integrate>

Integration. (2019). In *Merriam-Webster Dictionary*. Retrieved from <https://www.merriam-webster.com/dictionary/integration>

Jung, C. G. (1991). *The archetypes and the collective unconscious* (R. F. Hull, Trans.) (The collected works of C. G. Jung, 9:1, 2nd ed.). London, England: Routledge.

Kallio, E. (1998). *Training of students' scientific reasoning skills* (Doctoral dissertation, University of Jyväskylä, Faculty of Social Sciences, Jyväskylä, Finland).

Kallio, E. (2001). Reflections on the modern mass university and the question of the autonomy of thinking. In J. Välimaa (Ed.), *Finnish Higher Education in transition: Perspectives on massification and globalisation* (pp. 73–90). Jyväskylä, Finland: University of Jyväskylä, Finnish Institute for Educational Research.

Kallio, E. (2011). Integrative thinking is the key: An evaluation of current research into the development of adult thinking. *Theory & Psychology*, 21(6), 785–801.

Kallio, E. (2015). From causal thinking to wisdom and spirituality: Some perspectives on a growing research field in adult (cognitive) development. *Approaching Religion*, 5(2), 27–41.

doi:10.30664/ar.67572

Kallio, E. (2016a). Aikuisuuden ajattelun kehityksen laaja kenttä: perusteita ja avoimia kysymyksiä [The broad field of adult cognitive development: Premises and open questions]. In E. Kallio (Ed.), *Ajattelun kehitys aikuisuudessa: Kohti moninäkökulmaisuuutta* [Development of thinking in adulthood: Towards multiperspective thinking] (Research in Educational Sciences No. 71, pp. 15–55). Helsinki, Finland: The Finnish Educational Research Association.

Kallio, E. (Ed.). (2016b). *Ajattelun kehitys aikuisuudessa: Kohti moninäkökulmaisuuutta* [Development of thinking in adulthood: Towards multiperspective thinking] (Research in Educational Sciences No. 71). Helsinki, Finland: The Finnish Educational Research Association.

Kallio, E., & Marchand, H. (2012). An overview of the concepts of change and development: From the premodern to modern era. In P. Tynjälä, M.-L. Stenström, & M. Saarnivaara (Eds.), *Transitions and transformations in learning and education* (pp. 21–50). Dordrecht, the Netherlands: Springer.

Kamppinen, M., & Jakonen, J. P. (2015). Systems thinking, spirituality and Ken Wilber: Beyond New Age. *Approaching Religion*, 5(2), 3–14.

Kincheloe, J. L., Hayes, K., Steinberg, S. R., & Tobin, K. (2011). *Key works in critical pedagogy* (Bold Visions in Educational Research, Vol. 32). Rotterdam, the Netherlands: Sense.

Kincheloe, J., & Steinberg, S. (1993). A tentative description of post-formal thinking: The critical confrontation with cognitive theory. *Harvard Educational Review*, 63(3), 296–321.

Kleineberg, M. (2017). Integrative levels. *Knowledge Organization*, 44(5), 349–379. Retrieved from https://www.isko.org/cyclo/integrative_levels

Kohlberg, L. (1984). *The psychology of moral development: The nature and validity of moral stages* (Essays on moral development, Vol. 2). San Francisco, CA: Harper & Row.

Kohler, A. (2010). To think human out of the machine paradigm: *Homo ex machina*. *Integrative Psychological and Behavioral Science*, 44(1), 39–57.

Kramer, D. A. (1983). Post-formal operations? A need for further conceptualization. *Human Development*, 26(2), 91–105.

Kramer, D. A. (2003). The ontogeny of wisdom in its variations. In J. Demick & C. Andreoletti (Eds.), *Handbook of adult development* (The Plenum series in adult development and aging, pp. 131–151). New York, NY: Kluwer Academic/Plenum.

Kuhn, T. S. (1962). *The structure of scientific revolutions* (International encyclopedia of unified science 2, 2). Chicago, IL: University of Chicago Press.

Kunzmann, U. (2004). Approaches to a good life: The emotional-motivational side to wisdom. In P. A. Linley & S. Joseph (Eds.), *Positive psychology in practice* (pp. 504–517). Hoboken, NJ: Wiley.

Labouvie-Vief, G. (2015). *Integrating emotions and cognition throughout the lifespan*. New York, NY: Springer.

Laslett, P. (1994). The third age, the fourth age and the future. *Ageing & Society*, 14(3), 436–447.

Learning. (2019). In *Online Etymology Dictionary*. Retrieved from <https://www.etymonline.com/word/learning>

Lerner, R. M. (2018). *Concepts and theories of human development* (4th ed.). New York, NY: Routledge.

Lerner, R. M., & Overton, W. F. (2008). Exemplifying the integrations of the relational developmental system: Synthesizing theory, research, and application to promote positive development and social justice. *Journal of Adolescent Research*, 23(3), 245–255.

Lourenço, O. M. (2016). Developmental stages, Piagetian stages in particular: A critical review. *New Ideas in Psychology*, 40(Part B), 123–137.

- Lovejoy, A. O. (1936). *The great chain of being: A study of the history of an idea*. New York, NY: Harper.
- Malott, C. S. (2011). *Critical pedagogy and cognition: An introduction to a postformal educational psychology* (Explorations of Educational Purpose, Vol. 15). Dordrecht, the Netherlands: Springer Netherlands.
- Malpas, J. (2018). Hans-Georg Gadamer. In E. N. Zalta (Ed.), *The Stanford encyclopedia of philosophy* (Fall 2018 ed.). Retrieved from <https://plato.stanford.edu/archives/fall2018/entries/gadamer/>
- Marchand, H. (2001). Some reflections on post-formal thought. *The Genetic Epistemologist*, 29(3), 2–9. Retrieved from <https://www.dareassociation.org/documents/Some%20Reflections%20on%20Postformal%20Thought.html>
- Mascolo, M. F., & Kallio, E. (2019). Beyond free will: The embodied emergence of conscious agency. *Philosophical Psychology*, 32(4), 437–462.
- Mascolo, M. F., & Kallio, E. (in press) The phenomenology of between: An intersubjective epistemology for psychological science. *Journal of Constructivistic Psychology*.
- Misiak, H., & Sexton, V. S. (1973). *Phenomenological, existential and humanistic psychologies: A historical survey*. New York, NY: Grune & Stratton.
- Mortensen, C. (2016). Change and inconsistency. In E. N. Zalta (Ed.), *The Stanford encyclopedia of philosophy* (Winter 2016 ed.). Retrieved from <https://plato.stanford.edu/archives/win2016/entries/change/>
- Moshman, D. (2013). Epistemic cognition and development. In P. Barroiuillet & C. Gauffroy (Eds.), *The development of thinking and reasoning* (pp. 13–33). London, England: Psychology Press.
- Ontology. (2019). In *Merriam-Webster Dictionary*. Retrieved from <https://www.merriam-webster.com/dictionary/ontology>

- Overton, W. F. (2006). *Developmental psychology: Philosophy, concepts, methodology*. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology, Volume 1. R. M. Lerner (Ed.), Theoretical models of human development*. (6th ed., pp. 18–88). New York, NY: Wiley.
- Overton, W. F. (2010). Life-span development: Concepts and issues. In W. F. Overton & R. M. Lerner (Eds.), *The handbook of life-span development: Cognition, biology, and methods* (Vol. 1, pp. 1–29). Hoboken, NJ: Wiley.
- Palmer, R. E. (1969). *Hermeneutics: Interpretation theory in Schleiermacher, Dilthey, Heidegger and Gadamer* (Northwestern University studies in phenomenology and existential) Evanston, IL: Northwestern University Press.
- Perry, W. G. Jr. (1999). *Forms of intellectual and ethical development in the college years: A scheme* (Jossey-Bass higher and adult education series). San Francisco, CA: Jossey-Bass.
- Perttula, J., & Kallio, E. (1996). Postformaali ajattelu ja henkinen tajunnallisina toimintatapoina [Postformal thinking and mental awareness as cognitive practices]. *Psykologia*, 31(3), 164–173.
- Peters, M. A. (2007). Kinds of thinking, styles of reasoning. *Educational Philosophy and Theory*, 39(4), 350–363.
- Piaget, J. (1972). Intellectual evolution from adolescence to adulthood. *Human development*, 15(1), 1–12.
- Piaget, J., Garcia, R. V., Garcia, R., & Lara, J. (1989). *Psychogenesis and the history of science*. New York, NY: Columbia University Press.
- Piaget, J., & Inhelder, B. (1969). *The psychology of the child* (H. Weaver, Trans.). London, England: Routledge.
- Płóciennik, E. (2018). Children’s creativity as a manifestation and predictor of their wisdom. *Thinking Skills and Creativity*, 28, 14–20.

Psyche. (2019a). In *Lexico*. Powered by Oxford. Retrieved from <https://www.lexico.com/en/definition/psyche>

Psyche. (2019b). In *Online Etymology Dictionary*. Retrieved from <https://www.etymonline.com/word/psyche>

Ptolemy, C. (1940). *Tetrabiblos* (F. E. Robbins, Ed. & Trans.) (Loeb classical library No. 435). Cambridge, MA: Harvard University Press. (Original work published ca. 100–170)

Resnick, L. B. (1991). Shared cognition: Thinking as social practice. In L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 1–20). Washington, DC: American Psychological Association.

Robinson, O. (2013). *Development through adulthood: An integrative sourcebook*. Basingstoke, England: Palgrave Macmillan.

Schaie, K. W., & Zanjani, F. A. (2006). *Intellectual development across adulthood*. In C. Hoare (Ed.), *Handbook of adult development and learning* (pp. 99–122). New York, NY: Oxford University Press.

Schraw, G., Dunkle, M. E., & Bendixen, L. D. (1995). Cognitive processes in well-defined and ill-defined problem solving. *Applied Cognitive Psychology*, 9(6), 523–538.

Sears, E. (1986). *The ages of man: Medieval interpretations of the life cycle*. Princeton, NJ: Princeton University Press.

Settersten, R. A. (2003). Age structuring and the rhythm of the life course. In J. T. Mortimer & M. J. Shanahan (Eds.), *Handbook of the life course* (Handbooks of sociology and social research, pp. 81–98). New York, NY: Springer.

Showers, C. (1992). Evaluatively integrative thinking about characteristics of the self. *Personality and Social Psychology Bulletin*, 18(6), 719–729.

Sinnott, J. D. (1998). *The development of logic in adulthood: Postformal thought and its applications* (The Plenum series in adult development age aging). New York, NY: Plenum Press.

Smith, S. (2019). Wisdom as an embodied and embedded process. In G. M. Cseh (Ed.), *5th Annual Applied Positive Psychology Symposium: Proceedings of Presented Papers* (pp. 26–50). Buckinghamshire, England: Bucks New University. Retrieved from https://bucks.repository.guildhe.ac.uk/17819/1/17819_Cseh_G_Smith_M_Sims_C__Worth_P.pdf#page=27

Staudinger, U. M., & Glück, J. (2011). Psychological wisdom research: Commonalities and differences in a growing field. *Annual review of psychology*, *62*, 215–241.

Sternberg, R. J. (2013). Personal wisdom in the balance. In M. Ferrari & N. M. Weststrate (Eds.), *The scientific study of personal wisdom: From contemplative traditions to neuroscience* (pp. 53–74). Dordrecht, the Netherlands: Springer.

Sternberg, R. J., & Funke, J. (Eds.). (2019). *The psychology of human thought: An introduction*. Retrieved from https://www.psychologie.uni-heidelberg.de/ae/allg/mitarb/jf/IPHT_Online.pdf

Sternberg, R. J., & Glück, J. (Eds.). (2019). *The Cambridge handbook of wisdom*. New York, NY: Cambridge University Press.

Suedfeld, P., & Leighton, D. C. (2002). Early communications in the war against terrorism: An integrative complexity analysis. *Political Psychology*, *23*(3), 585–599.

Swartwood, J., & Tiberius, V. (2019). Philosophical foundations of wisdom. In R. J. Sternberg & J. Glück (Eds.), *The Cambridge handbook of wisdom* (pp. 10–39). New York, NY: Cambridge University Press.

Takahashi, M., & Bordia, P. (2000). The concept of wisdom: A cross-cultural comparison. *International Journal of Psychology*, *35*(1), 1–9. doi:10.1080/002075900399475

Teo, T. (2010). Ontology and scientific explanation: Pluralism as an *a priori* condition of psychology. *New Ideas in Psychology*, *28*(2), 235–243.

Von Wright, G. H. (2004). *Explanation and understanding* (Cornell classics in philosophy). Ithaca, NY: Cornell University Press.

Walsh, R. (2015). What is wisdom? Cross-cultural and cross-disciplinary syntheses. *Review of General Psychology, 19*(3), 278–293.

Wennerberg, H. (1967). The concept of family resemblance in Wittgenstein's later philosophy. *Theoria, 33*(2), 107–132.

Wilber, K. (2001). *A brief history of everything* (2nd ed.). Dublin, Ireland: Gateway.

Wozniak, R. H., & Fischer, K. W. (Eds.). (1993). *Development in context: Acting and thinking in specific environments* (The Jean Piaget symposium series). Hillsdale, NJ: Erlbaum.

Wu, P.-L., & Chiou, W.-B. (2008). *Postformal thinking and creativity among late adolescents: A post-Piagetian approach. Adolescence, 43*(170), 237–251.

Yang, S.-Y. (2008). A process view of wisdom. *Journal of Adult Development, 15*(2), 62–75.

Zerubavel, E. (1989). *The seven day circle: The history and meaning of the week*. Chicago, IL: University of Chicago Press.

¹ The article is a modified version of an earlier article by Kallio (2016a).