

## A multi-disciplinary model of life-course canalization and agency

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### ABSTRACT

This article integrates life-course sociological insights and perspectives with the conceptions of agency and individual motivation formulated as the motivational theory of life-span development. We use Waddington's epigenetic landscape as a metaphor for how life courses are shaped jointly by societal structure and individual agency. Social structure imposes constraints and institutions provide the transitions and pathways that together constitute critical scaffolding for life-course timing and path dependency ("canalization"). The building blocks from developmental and motivational psychology as well as from life-course sociology are introduced first. Then we address the dynamic interplay of individual agent and society in terms of life-span timing and life-course canalization (i.e., path-dependency) effects. The proposed conceptual framework moves beyond previous accounts of agent-society interplay in two distinct ways. First, we develop a systematically organized set of specific phenomena of *developmental canalization* on the one hand, and of *institutionalized or social-structure based canalization* on the other. Second, we offer a discussion of a set of scenarios that show how these specific psychological and society-generated processes may play together to shape individuals' life courses and life-span development.

### 1. Introduction

The aim of this article is to integrate the perspective of life-span developmental psychology and life-course sociology to understand the *dynamic interplay* between *social structure and institutions* on the one hand, and *individual agency* on the other hand. In this context, we pay special attention to the opportunities and constraints involved in prescriptive societal institutions and norms regarding age-related timing, and in canalizations imposed by social structure and societal institutions as well as instantiated by individual developmental processes. To this end, we introduce the novel notions of developmental canalizations on the one hand, and societal canalizations on the other, a set of specific phenomena that result from each, and a discussion of how these two forms of canalizations may interact. This kind of conceptual discussion goes beyond previous accounts in that it explicitly addresses path-dependency as reflected in canalizations in both, the life-span developmental and the life-course sociological analysis, and finally also integrates these two perspectives.

The disciplines of *psychology* and *sociology* are intellectually well-positioned to complement each other by asking how the developmental processes transforming individuals across the life span are shaped by the structuring impact of institutions and social inequality, and what role individual (life course) agency plays for life course and developmental outcomes (Diewald & Mayer, 2009; Hitlin & Kwon, 2016; Mayer, 2009, 2015; Schoon & Lyons-Amos, 2016; Settersten, 2009). Developmental psychology and life-course sociology share common

units of analysis in terms of *individuals* moving through the societally organized life course.

We anchor our conceptual framework in Waddington's epigenetic landscape as it may be regarded as a *metaphor* for the interface of structure and agency in the life course. This interface is one of *canalization*, where societally and developmentally structured paths guide individuals' life courses along timed and sequenced paths, and buffer these paths against disturbances, while at the same time providing age-structured opportunities and challenges for the individual agent (see also Heckhausen, 1990, 1999; Heckhausen & Schulz, 1999). It is important to note that the Waddington model is used as an illustrative metaphor, and not as a model exactly reflecting the dynamic interaction of individual and social structure. In this respect, for example, the metaphor of the golf ball used by Waddington does not reflect the *active* nature of individual agency. However, the Waddington model captures well the path-dependent nature of canalization.

The idea of the epigenetic landscape presented by Waddington (1957) is especially useful to illustrate the mechanisms involved in canalization along certain paths (see also the "road juncture" version of "path dependency" in the social sciences and economics, as discussed in Bernardi, Huinink, and Settersten., *this volume*) and given agency (see Fig. 1). Waddington's epigenetic landscape model is grounded in developmental biology, and originally was designed to illustrate how initially identical epithelial cells develop into such different outcomes as hair, feathers and scales. As the figure shows, at the start the cells that are shown as two balls (a) and (b) rolling down a structured landscape,

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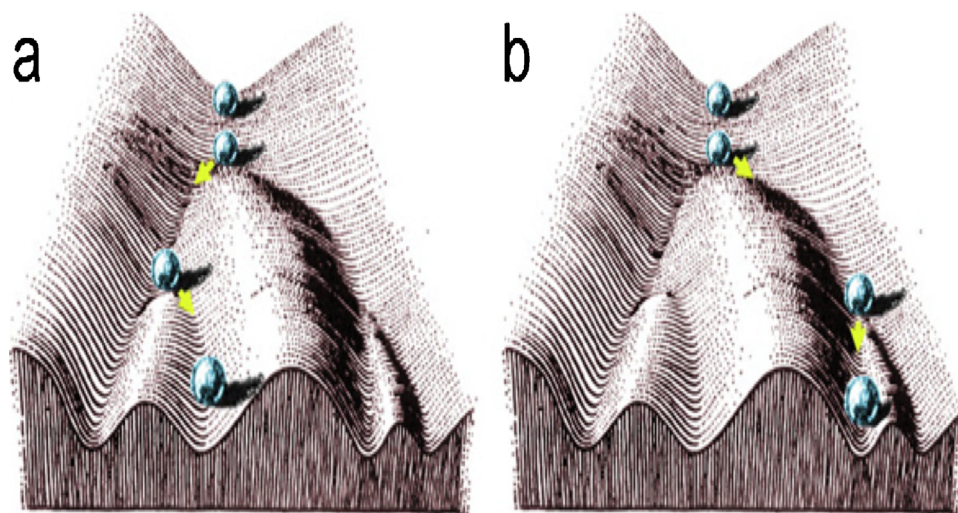


Fig. 1. Waddington's epigenetic landscape showing two alternative paths (adaptation after Waddington, 1957).

have very similar potential to go either left or right down the different crevices and valleys in the mountainside. (1) At this early point, even small differences in external circumstance can push the ball into either of the crevices which then lead into valleys that dig deeper and deeper into the landscape. (2) The further down the ball rolls the more difficult it is to change course, because that would require to overcome the hill or mountain blocking access to the neighboring valley. (3) Also, the further down into a valley a ball rolls, the further apart its endpoint is from the ball following the neighboring valley. All these characteristics are found in societal canalizations of individual life paths too. Societal canalization provides opportunities along the path and constraints limiting deviation from the path. (4) When we use the landscape metaphor to illustrate agency within a time-ordered structure of opportunities and constraints in the human life course, we have to think of the entity traveling through the landscape as an active organism, not a passive object such as a ball in Waddington's metaphor. Individual agency becomes critical in two respects: (a) at age-graded choice points between two valleys, and (b) when effort is needed to escape a canalized path and overcome the hill/mountain to reach the next valley.

Against the background of this metaphoric description of the life course we first lay the disciplinary building blocks from life-span developmental psychology and life-course sociology. We start out with the motivational characteristics of individual agents who move through their life course, choose, pursue, change and give up goals in an action field of opportunities and constraints set up by the social institutions and societal structure and their historical change, which we discuss next. Individuals adapt to and choose paths that are available in the existing age- and SES graded societal landscape, but under certain historical and individual conditions may also make attempts to find new paths or transform existing paths in their striving to attain desired life-course outcomes.

We then specify theoretical propositions about the dynamic interplay of agency and society with regard to first, the role of life-course timing and social position, and second, the developmental and institutional or social-structure based processes jointly bringing about life-course canalization. Especially regarding life-course canalization, we are modeling our conceptions along the characteristics of Waddington's epigenetic landscape as applied to the societal structuration of the life course and how those interface with fundamental psychological processes of individual development and motivation. We arrive at a set of propositions regarding optimal and suboptimal timing of agency in the life course, the effect of age-grading and social structure on specific characteristics of motivation and self-regulation essential to life-course agency, and identify the major mechanisms in developmental and institutional or social-structure based canalization

that guide, constrain, and amplify individual agency in the life course.

## 2. Individual agency: motivation and action regulation

Individual agency in the life-course can be conceptualized in a *motivational and action-theoretical framework*, as we have done in our research (Heckhausen & Schulz, 1993; Heckhausen, 1999, 1995; Heckhausen & Shane, 2015; Heckhausen, Wrosch, & Schulz, 2010, 2018; Heckhausen, Wrosch, & Schulz, 2013; Schulz & Heckhausen, 1996) and others have done too (Brandtstädter & Rothermund, 2002; Brandtstädter, Krampen, & Heil, 1986; Brandtstädter, 1998; Freund & Baltes, 2000; Freund, 2008; Knecht & Freund, 2018).

### 2.1. Motivation for goal pursuit as a function of expectancies and values

Individuals' motivation to pursue certain goals depends on their *expectancies and their values* (expectancy-value models of motivation, Beckmann & Heckhausen, 2017). In the life-course agency context, this means that individuals make decisions about which goals (e.g., to get an educational degree, enter a career, start a family) to engage with and which to disengage from as a function of (a) their expectancies regarding potential developmental goals (e.g., Are there opportunities? Do I have skills to attain the goal?) and (b) their values regarding these goals (e.g., Is this a desirable outcome for me? How do important people in my network see these goals? Does the goal represent me as I think about myself, my identity)?

*Expectancies* regarding education, career, family and the life-course in general are strongly shaped by societal institutions and social structure as they affect opportunities and constraints. These are typically transparent and thus reflected in what individuals expect and strive for during particular times in the life course. For example, around the end of the second decade of life, young people are expected to complete compulsory schooling and embark on a path that will determine their ultimate career, resources to build a family, and position in society. Much is at stake during this time of life, much like the decision points in the epigenetic landscapes when the balls enter one of a set of alternative valleys. People know about these often strongly age-graded decision points, and this leads them to proceed into a phase of motivated action that reflects the time-urgency implied in the epigenetic landscape. Moreover, individuals internalize age-related norms of behavior and attainment and use those to compare themselves and their standing with regard to important developmental tasks (e.g., entering a career, finding a romantic partner) as well as other people's standing with these norms (Heckhausen & Krueger, 1993; Settersten, 2003).

When we are considering actions that address long-term goals, the

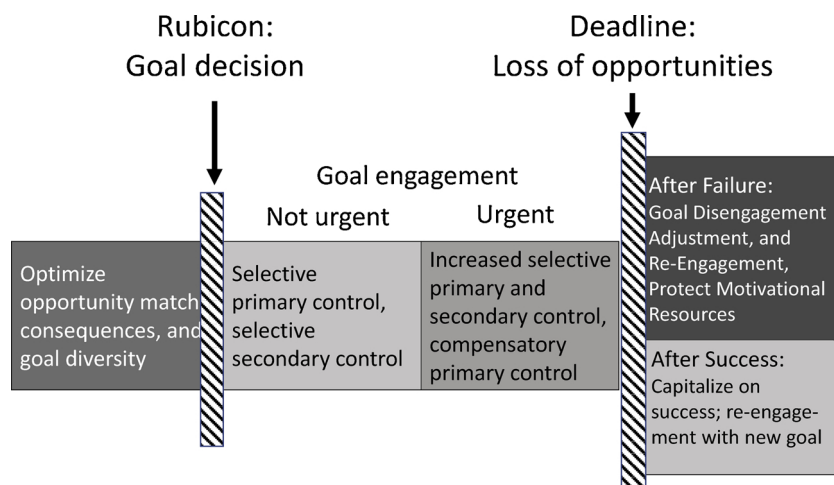


Fig. 2. Action-phase model of developmental regulation (adopted from Heckhausen, 1999, Figure 5. 1, page 114).

corresponding field of action is the respective part of the life course. The societal structuring of opportunities and constraints both across lifetime and across social strata sets the *action field* for the individual, more or less closely delineating potential pathways (or valleys in the epigenetic landscape) for individuals from different backgrounds and at different times in the lifespan. We will discuss the societal structuring in greater detail below, but for now it is important to understand that individuals hold mental representations of the opportunities and constraints and thus the possible paths they can take. These mental representations of possible and blocked or difficult paths guide individuals' decisions about which goals to pursue when and which goals to disengage from when. For decisions about engagements for goals, not only controllability estimates are important, but (at least for the prudent developmental agent) longer-term and cross-domain heuristics of maximizing primary control over one's life time (e.g., long-term career consequences of choosing a study major) and across life domains (e.g., implications of a career move for family planning). Thus, such mental representations reach far beyond the immediate or medium-range future, well into adulthood and for some issues (e.g., financial planning) even into old age.

Individuals often face trade-offs between work, family, and health that require the weighing of consequences of goal decisions. Certain contexts such as pressing material need, strong peer pressure, heavy responsibilities, or enticing benefits, and certain individual characteristics, such as a disposition for impulsive, high-risk decision making make it less likely that someone will use such prudent heuristics.

Regarding the *values* that underlie decisions to become engaged with or disengage from developmental goals, one can differentiate between more fundamental psychological needs or motives on the one hand and more contextually-elaborated developmental goals in a given social ecology on the other hand. Regarding the former, the universal and most fundamental drive in human agency is to influence one's environment and one's future through one's own behavior. This idea is captured in the proposition of the motivational theory of lifespan development (MTD, Heckhausen et al., 2010) that *primary control striving* holds functional primacy in the motivational system. Throughout life, the striving to control one's environment remains strong, even if the goals at which it is directed are adjusted to the concurrent capacity for successfully realizing primary control. Regarding the values associated with *developmental goals*, individuals in a given society share *basic values for a successful life* (e.g., longevity and health, productivity, good relations with others). Many of these basic values reflect the big three (implicit) motives for *achievement* (mastering environment), *affiliation/intimacy with others*, and *power* (i.e., influencing others) (Heckhausen & Heckhausen, 2018).

Further relevant individual differences influencing individuals'

choice of developmental goals may be the degree to which either of the three implicit motives dominates their motivational system, their risk tolerance, dispositional optimism, their tendency to persist in the face of difficulty, and their capacity to disengage from futile goals as well as with regard to the extent they know and master their motivational and volitional tendencies.

### 2.2. Action-phases in pursuit of developmental goals: selecting, engaging and disengaging

Individual agency in pursuit of developmental goals unfolds in *action cycles* that are composed of a *sequence of action-phases*. The motivational theory of lifespan development includes a *sequential model of action phases*, which reflects individuals' motivated behavior and how it is adapted to age-graded changes in opportunities and constraints for attaining important life goals (Heckhausen et al., 2010). As a sequential model of action phases, it addresses not only the process of deciding for a goal, but also encompasses the phase of goal pursuit by engagement with the goal (investing effort and other resources), of goal disengagement and/or goal adjustment in case the chosen goal no longer is attainable or becomes too costly (e.g., because other goal pursuits suffer), and of goal re-engagement in terms of reinvesting action resources after disengagement in more promising goals (see Fig. 2 "Action-phase model of developmental regulation").

The *mind-set* of individuals radically changes between the *phase of deliberating* a goal decision and the *phase of implementing* a goal after having decided which goal to pursue (H. Heckhausen & Gollwitzer, 1987; Gollwitzer, Heckhausen, & Steller, 1990). During the deliberative decision-making process, individuals try to widen their knowledge base about possible pros and cons and try to be as even-handed as possible, avoiding hasty decision making and bias. In contrast, when implementing goal striving after having made a decision, the mind-set switches to a volitional mode of functioning. A volitional mode of functioning allows individuals to narrow their focus and preferentially consider information that helps with implementing the action goal and with avoiding any distractions and doubts that could potentially undermine the commitment to the goal.

In the metaphor of the epigenetic landscape this switch from deliberative to implemental mind-set would mean that during the deliberative phase the slope is shallow, so individuals move slowly and cautiously, whereas after crossing the decisional Rubicon, the valleys slopes down and hurries the individual forward into the valley. People become more completely engrossed with their chosen path in life (e.g., specific career, marriage partner) and do not look back at alternatives they passed up. This has the advantage of being more satisfied with the life-course path one is pursuing and one's place in society, but also

bears the risk that one ignores problematic developments (e.g., that one's career path is becoming obsolete with changing technologies) and ends up in a career dead-end, unemployment, and financial ruin.

Given that the implementation-oriented mind-set biases and protects one's chosen goal and life path, the transition between goal engagement and goal disengagement is challenging. Especially with long-term goals such as those pertaining to development and life-course, experiencing sufficient set-backs to become open to consider disengagement may stretch over a lengthy time period. Individuals may experience entrapment with a project they have invested in for a long time and that is not yielding the anticipated outcomes. This situation is captured in conceptual and empirical work on "action crisis" conducted by Veronika Brandstätter and her collaborators (e.g., Brandstätter, Herrmann, & Schüler, 2013). In the epigenetic landscape, entrapment can be represented by a valley that leads into a dead-end, blocked by an unsurmountable mountain.

### 3. Landscape of the life course: historical context, institutions and social structure

Applying the metaphor of the epigenetic landscape, individuals move through the life course, navigating through the fields of social opportunities and constraints established by the historical context, social institutions, and the social structure (Hagestad & Dykstra, 2016; Kohli, 2007; Mayer, 2009; Buchmann, 1989; Buchmann & Kriesi, 2011). Historical circumstances, institutional arrangements, and the structure of social inequality shape the contours of the life course in that they make up the action space for individuals to choose and pursue their goals, and find their path through life. They closely delineate potential pathways for individuals to strive for, set up sequences of personal developmental goals, and deadlines for attaining them (Buchmann & Steinhoff, 2017a, 2017b; Heckhausen et al., 2010, 2018; Wrosch & Heckhausen, 1999; Heckhausen, Wrosch, & Fleeson, 2001).

#### 3.1. Historical context

Historical circumstances related to the overall economic situation (e.g., boom or bust), the cultural climate (e.g., the "Zeitgeist" represented in aspirational mindsets versus depressive moods), or political settings (e.g., political stability or rapid social change) leave profound imprints on the landscape of the life course. This has been amply demonstrated by Elder (1974) classic work on the children of the Great Depression and, more recently, by Heinz (2014) and Crosnoe (2014) for the repercussions of the Great Recession on youth, or by Diewald et al. (2006) and Silbereisen (2016) for the impact of German unification and the concomitant rapid social change on life-course outcomes.

Depending on the individual's life stage, historical circumstances may not only be perceived and evaluated differently, they may also show varying effects on life-course achievements. When young people attempt to enter the labor market in times of bleak employment prospects, their early work careers may be severely hampered, potentially leaving 'scars' on their future work life (Danziger and Ratner, 2010). Compared to experienced workers, labor market entrants constitute the group of workers treated as "last in" and "first out," thus significantly curtailing their opportunities and imposing severe constraints not only on their careers, but also on their resources to build a family. Family formation and parenthood may be stalled in times of economic bust given the uncertain prospects to support a family, thus entailing the potential to fundamentally alter individuals' life goals and life paths in multiple life domains. How profoundly elements of uncertainty and unpredictability with respect to the outcomes of individual life-course choices matter (e.g., uncertainty to complete education in the Breen-Goldthorpe's 1997 model), does not only depend on the individual's position in the social structure, but also likely varies by institutional arrangements, and the individual's agentic capacities.

#### 3.2. Social institutions

From an *institution-focused* perspective, the life course is conceived as a complex normative structure consisting of *interlocking/interrelated and institutionalized sequences of positions and roles* in various life domains, often referred to as institutionalized sequences of status-role-configurations (e.g., Buchmann, 1989; Kohli, 2007; Levy & Bühlmann, 2016). They are partially age-graded, based on cultural beliefs and social norms about age-appropriate behavior, timing, and sequencing of status/roles (Settersten, 2003), thus substantially corroborating the life-course structure (Settersten & Hagestad, 1996.).

The *state* exerts a particularly strong structuring impact on life course patterns through its welfare institutions and related policies, dealing with life course risks and adversities by providing (age-graded) benefits and buffers (Diewald, 2016; Leisering, 2003). Such provisions bridge non-normative discontinuities in the life course (e.g., unemployment spells) and smooth normative transitions (e.g., entry into retirement). Individuals take these buffers into account when making educational choices, as well as career- and family-related decisions. As the buffering role of the welfare state varies across societies, so does the state's impact on shaping the landscape of the life course (Breen & Buchmann, 2002; Buchmann & Kriesi, 2011; Mayer, 2005).

*Status transitions* or *status passages* (e.g., leaving the parental home, from school to work, or into parenthood) are part and parcel of the institutionalized life course, representing institutionalized changes in positions and roles, often labeled as status passages (Bird & Krüger, 2005; George, 1993; Levy & Bühlmann, 2016). They indicate movements in the social structure (i.e., mobility processes) and imply shifts in individual status, social affiliations, access to valued assets, and social participation. These institutionally framed transitions are critically important events in the life course as they mark the entry into novel social settings characterized by their own values and norms, opportunities and constraints, status and roles as well as social relationships and identities. Being the focal points of the institutionalized sequences of positions and roles, transitions embody the institutional patterns of such pathways and therefore lend themselves to the analyses of their structuring impact on opportunities and constraints across the life course. It is during transitions that individual choice and motivated behavior has the greatest impact on the life course and lifespan development of the individual.

Status transitions are highly significant from the perspective of *social inequality* as they matter for social positioning, by either opening up or foreclosing social opportunities (Buchmann & Steinhoff, 2017b; Buchmann & Steinhoff, 2017a). For the process of transitioning, *institutional gatekeepers* (e.g., teachers, employers), play an important role as they control to a considerable degree whether entry into a given status position is granted (Bayard, 2013; Hollstein, 2007). Biased or stereotyped group-specific attributions may block applicants regarding, for example, educational transitions or career mobility steps, and thus contribute to the reproduction of social inequality (Behrens & Rabe-Kleberg, 2000; Gomolla & Radtke, 2007; Hollstein, 2007).

Once a status transition has been accomplished, individuals are confronted with settling into the new (part of a) trajectory by adjusting to the values and norms prevalent in the new social setting, establishing satisfactory relationships with novel social actors, and fine-tuning their identity to be in line with the new status and role. In general, the social expectations and values associated with having embarked on a trajectory – for example, being in college after deciding for a major; working after getting hired for a given job or being in a marriage after finding a partner – are rather well laid-out. They belong to the cultural repertoire – they are like scripts for individuals to follow or tracks to run on (Buchmann, 1989). This is particularly the case in well-buffered and institutionally regulated trajectories when precise rules serve as guardrails along which individuals move.

### 3.3. Social inequality and the landscape of the life course

The *position in the structure of social inequality*, arranging access to desirable status transitions, resources, power, respect and esteem (Ridgeway, 2014), determines how easily an individual can make progress along a chosen path or, vice versa, how much uncertainty and unpredictability is involved. Lower-class individuals have to overcome barriers (or in the metaphor of the epigenetic landscape: climb over mountains) and face heightened uncertainty if they want to transition from the educational and career paths they are canalized into by their social position to the life paths dominated by upper-class members. In the context of the epigenetic landscape, high versus low social positions tilt the landscape to the right or left and thus channel individuals to the respective higher or lower status career paths into adulthood.

The individual's social position also shapes the extent to which *socially valued assets* can be *mobilized* to cope with the demands of the institutionalized life course and the historical circumstances, thus increasing the chances of attaining desirable life course outcomes and preventing life course risks (Bourdieu, 1984; Jackson, 2013). Higher social positions come with more *financial* resources, putting parents more at ease to support their offspring in pursuing desirable and even risky (educational) trajectories and helping them back on track if something goes awry or they stray off the expected path. Higher social positions are also associated with a greater stock of *cultural* resources associated with the dominant culture, providing advantages in handling institutional requirements and successfully negotiating with institutional gatekeepers (Hollstein, 2007; Lareau, 2003). This cultural familiarity with how institutions work is an asset when attempting to successfully master the demands of life course trajectories considered successful in a given society. Moreover, the *social networks* of families and individuals in higher social positions are larger and more diversified, thus providing helpful information, contacts, and tangible assistance for many life course circumstances. The combination of these three types of assets (i.e., financial, cultural and social-network related), shape the extent to which opportunities related to the *institutionally* framed transitions and pathways through the life course may be seized and constraints can be circumvented. In our landscape metaphor, one might say that lower-class individuals do not have the mountain-climbing equipment and the rope team that higher SES individuals have readily at their disposal.

As individuals move through the landscape of the life course sculptured by their position in the structure of social inequality, they consider the horizon of educational and occupational choices deemed feasible and appropriate. These deliberations may be guided by the goal of *status maintenance* or by aspirations for *upward mobility*. Explaining to a large part the reproduction of status positions from one generation to the next (Breen & Goldthorpe, 1997; Hahn, 2016), individuals from high-status families in particular are required to develop a strong striving to reach higher educational degrees and invest in long educational careers in order to avoid downward status mobility (Diewald, 2016:681). The stakes for status maintenance are especially high under conditions of economic crisis and the inflationary loss of value of tertiary education, thus rendering the striving for (re)attaining one's parents' social status and avoiding downward class mobility an embattled and stressful endeavor. Individuals from lower-status families have a shorter educational distance to run in order to achieve status maintenance. However, upward mobility goals are common at least in the U.S. (Shane & Heckhausen, 2013) and especially among children of immigrants. For upward mobility, the educational challenges are even more daunting, and involve overcoming multiple barriers (or in the metaphor of the epigenetic landscape: climb over mountains), requiring greater capacities, talent, and willingness to exert effort compared to their high-status counterparts.

## 4. Dynamic interplay of individual agency and societal structures

The societal and agency components of our life-course model *interact* with each other, generating a *complex dynamic of structure and agency* for the unfolding of the individual life courses. In our consideration of psychological and sociological perspectives, we focus on two important aspects, referring to the life-course timing, and in particular and greater detail, to life-course canalization, where we distinguish between *developmental* and *institutionalized* or social-structure based canalizations. In both instances we limit ourselves, due to space limitations, to elaborate a set of several major interfaces of life-course structure and individual agency.

### 4.1. Life-course timing and agency

To illustrate the complex web of societal and agency components regarding the timing in the life course we focus, in an exemplary way, on three propositions: First, life-course agency is not uniformly effective throughout the life course. It is less needed when individuals move on a well-buffered (institutionally regulated) path (e.g., after being selected to an educational track or having decided for a study major). Strong individual agency is needed more at times of transition, when the individual is making a decision about which path to take, and especially when an individual "swims against the stream," that is, doing things off-time or deviating from the typical life-path of peers in one's social group (e.g., first-generation college student). Transitions are critical to get into the more advantageous path (e.g., better education) in the first place, but also when trying to compensate for earlier disadvantage by changing course (e.g., getting university access via a GED after dropping out of high-school earlier). Under conditions of transition or deviance from one's social group, strong self-regulatory capacities are required to achieve successful life-course agency.

Second, status transitions in the institutionalized trajectories require appropriate age-related timing for action as the 'windows of opportunity' inherent in transitions turn into constraints (i.e., deadlines) when agency is not activated at the appropriate time. This means that, depending on the age structure of transitions (e.g., early educational tracking), early manifestations of agency may be more decisive than later ones (or vice versa) (Buchmann & Steinhoff, 2017b; Buchmann & Steinhoff, 2017a; Steinhoff & Buchmann, 2017). This also implies that engagement with a given developmental goal can become urgent when facing rapidly declining opportunities (e.g., a final promotion in a strongly age-graded career; child-bearing in the fourth decade of life). Such declining opportunities can constitute *developmental deadlines* (Heckhausen, 1999; Heckhausen, Wrosch, & Fleeson, 2001; Wrosch & Heckhausen, 1999). Once opportunities decline below an acceptable degree of controllability or required investments to overcome adverse age-related constraints become too costly, individuals need to disengage from obsolete and futile goals to focus on those goals that are still attainable (see review of relevant empirical work in Brandstätter, 2018; Heckhausen et al., 2010).

Third, institutionalized trajectories shape expectancies and goal setting in a given society. The opportunities and constraints inherent in an institutionalized path are typically *transparent* and thus are reflected in the individual's *expectancies*. There is a sense of what can be reached and what is beyond reach, although in some societal context expectancies of social mobility (e.g., rags-to-riches ideals of the American Dream) are enhanced. Beyond the structuring impact of societal institutions, social norms about age-appropriate behavior and role sequencing influence individuals' *goal setting*. People internalize such norms and compare themselves and their standing with regard to important developmental tasks (e.g., entering a career, finding a romantic partner) as well as other people's standing with these norms (Heckhausen, 1999; Krueger, Heckhausen, & Hundertmark, 1995).

## 4.2. Life-course canalization and agency

In the life course cube presented by Bernardi and colleagues in this volume, the authors discuss the phenomenon of path dependency as referring to the first-order time-related interdependence in the life course. This implies that developmental processes and life course trajectories become “locked in” or *canalized* by some critical preceding societal condition or by some critical preceding decision taken by the individual. Hence, the basic idea is that “an initial state at the  $t$ ” – or the entire previous string of states – “causally conditions later outcomes at time  $t + 1$ ” (see also Bernardi, 2014:75). A basic tenet in the path dependency literature is that deviation from the selected paths by changing or switching course (i.e., behavioral patterns, partner choice, educational/career trajectories) becomes ever more *costly* the longer an individual has been involved in the pattern/trajectory, and thus requires enhanced resource investment by the individual. This converges with the characteristics of the epigenetic landscape used as the guiding metaphor for our model. Differences between paths become *amplified* with progress along the chosen path, both in terms of institutional entanglement and in terms of individual specialization.

From an *interdisciplinary* conceptual perspective, we suggest to distinguish *two interdependent types* of path dependency or canalization at the individual life-course level. The first type, labeled *developmental canalization*, refers to path dependency that comprises psychological changes that come about through an individual’s *linked* behavioral choices along a lifespan developmental trajectory. The second one, labeled *institutionalized or social-structure based canalization*, comprises changes in the societal action field of a given individual, comprised by opportunities and constraints that result from *selecting* or *being allocated* to a particular sequence of transitions and paths that are regulated by educational, vocational or other societal institutions.

Together, these processes of developmental and institutionalized or social-structure based path dependency comprise individuals’ *life-course canalization* and to the extent that they are self-reflective and transformative of an individual’s social context, we can even conceptualize them as self-socialization (Heinz, 2009).

## 4.3. Developmental canalization

We conceive of developmental path dependency as the *canalization of developmental processes* coming about through various mechanisms. Basically, these mechanisms represent *adaptive* or *maladaptive* developmental processes in the individual’s life course development, which amplify differences between individuals the longer they stay on a given developmental path (e.g., education, career, expertise development, self-medication and addiction). Developmental canalization can be carried by diverse aspects of psychological functioning such as motivational bias after crossing the decisional Rubicon for a particular path and goal set, as well as cognitive, perceptual and motor specialization.

### 4.3.1. Accumulated perceived personal control

Specific accumulated experiences with one’s own effectiveness in dealing with the environment, attaining goals, and thus realizing one’s primary control potential, give rise to *generalized expectancies about one’s control of the environment* (i.e., control beliefs, perceptions of control; Rotter, 1966; Skinner, 1996) and to one’s degree of *dispositional optimism* (Scheier & Carver, 1992). Moreover, starting in mid-childhood, individuals develop more and more differentiated representations about their domain-specific competencies and developmental potential, sometimes referred to as dimensional comparisons (Marsh et al., 2014). This may lay the developmental and motivational foundations for specialization, niche-fitting, and what the Baltes and Baltes pre-SOC model called “selective optimization” (Baltes & Baltes, 1989). Notably, expectancies about what one is good at strongly influence what one finds valuable, so that high expectancies regarding a certain educational or career path, can lead to its enhanced valuation (Eccles &

Wigfield, 2002).

### 4.3.2. Specialization

The individual’s accumulation of idiosyncratic experiences and capacities within and across life stages constitutes developmental canalization. While developing more and more differentiated representations about their own domain-specific competencies and developmental potential (Eccles & Wigfield, 2002), individuals tend to increasingly select matching developmental opportunities and reject others, propelling a process of selective optimization (as it were in the pre-SOC model “Optimierung durch Selektion und Kompensation” (Baltes & Baltes, 1989) and leading to ever more focused preferences and expertise. Expertise development has the potential of attaining substantial growth of competence in the selected area of functioning, but typically at the expense of unattended areas of functioning. This is particularly true for extremely high levels of performance where extensive and effortful deliberative practice is required (Ericsson, Krampe, & Tesch-Römer, 1993; Ericsson, 2004).

### 4.3.3. Selective goal commitment

The multiple changes associated with status transitions require exigent adaptation processes (Bleidorn, 2012; Heinz, 2009), including the engagement with new and disengagement from obsolete goals (Brandstätter, 2018; Heckhausen et al., 2010). As individuals negotiate major life-course transitions, they explore, invest in, succeed, and fail with certain paths into qualification, employment, and family building. In a process of self-socialization, they adjust goals and self-conceptions accordingly (Heinz, 2009), moving motivationally further away from given-up goals and becoming ever more committed to chosen goals for their life course.

### 4.3.4. Social network selection

Developmental canalization can also be promoted via goal-optimizing social networks. Individuals can assist themselves with sticking to a chosen developmental path and also find helpful social models by selecting their close and regular interaction partners to be similar in the preferences, interests, activities, and goals. These preferred interaction partners then become influential socialization agents and thus push the individual further along the chosen path. In this way, the individuals not only changes themselves, but also help shape a social context that is enticing for pursuing the developmental path further, a truly transactional process. The individual thereby transforms his or her *social-developmental ecology* to in effect achieve a kind of *self-socialization* via their own social network (Heinz, 2009).

### 4.3.5. Over-commitment and entrapment

Long-term commitment to certain life goals can become dysfunctional when the goal is no longer attainable or only attainable at excessive cost for other domains of life. When individuals are motivationally and socially committed to certain long-term life goals and trapped by an implementation-oriented mind-set, the transition between goal engagement and goal disengagement can become extremely challenging. Especially with long-term goals such as those pertaining to development and life-course, experiencing sufficient set-backs to become open to consider disengagement may stretch over a lengthy time period. Individuals may experience entrapment with a project they have invested in for a long time and that is not yielding the anticipated outcomes. This situation is captured in conceptual and empirical work on “action crisis” conducted by Veronika Brandstätter and her collaborators (Brandstätter et al., 2013; Brandstätter, 2018; Brandstätter et al., 2013). This situation is a case in point of a developmental canalization that has potentially maladaptive consequences.

## 4.4. Institutionalized or social-structure-based canalization

The self-selection into an institutionalized trajectory or the

allocation to it by others (e.g., institutional gatekeepers) confronts the individual with a set of more or less advantageous set and sequence of opportunities, consequently requiring the adjustment of life course expectancies and goal setting. We label these processes as the *societal canalization* of individual life paths.

#### 4.4.1. Expected constraints

The patterns of opportunities and constraints inherent in a path shape the development of life course agency and largely defines the final (status) outcome to be attained (Bernardi, 2014). As the opportunity structure associated with an institutionalized trajectory is rather *transparent*, individuals' expectancies and goal setting are likely to be calibrated accordingly. In case of severely restricted opportunities associated with a trajectory, processes of 'cooling out' (Bayard, 2013; Solga, 2005) are likely to set in. Depending on whether the foreclosure was expected or not, individuals will have less or more difficulties disengaging from a futile goal and reinvesting in a new adjusted goal.

#### 4.4.2. Cumulative disadvantage

Canalization can be enhanced if current levels of disadvantage have a causal effect on its future level (Bernardi, 2014; DiPrete & Eirich, 2006). As institutionalized trajectories are associated with particular opportunity structures (e.g., learning opportunities, status mobility), the accumulation of the respective (dis-)advantage may grow or decrease *disproportionately*, greatly affecting the individual's future life chances and agency development. We maintain that the earlier in the life course status transitions are institutionalized (e.g., early educational tracking) the greater the risks for cumulative (dis-)advantage.

#### 4.4.3. Inter-generational status maintenance and constraints in upward mobility goals

Individuals' position in the structure of social inequality influence their expectancies and goal setting. According to social position theory (Keller & Zavalloni, 1964), the relative distance between the parental social position and the (aspired) social position shapes the degree to which the latter is *feasible* for the individual (Hahn, 2016: 52). Hence, social background shapes the social mobility goals individuals set for themselves. We also expect that more general beliefs about social mobility are influenced by social status and individual experiences with successful or unsuccessful attempts at upward social mobility (Heckhausen & Shane, 2015, 2017). However, within institutions of education (e.g., university campus) and professional training (e.g., law school), peer contact and comparison also provide strong social ecological pressures to follow normative goals, whether they are congruent with or exceeding the realm of parental social status. Also, it is important to keep in mind that social-inequality based patterns of opportunities and constraints are often *less transparent*, especially when relying on financial resources, fallback options and network inequalities (i.e., weak ties, Granovetter, 1973). Individuals are therefore more likely to be uncertain about *expectancies* for goal attainment. Under conditions of ideologically enhanced expectations (e.g., "American Dream") individuals likely generate overambitious goals and then may blame themselves for not attaining them.

Individuals (based partly on parental decisions about school choice) may select themselves into certain life-course trajectories by exhibiting a preference for intergenerational status maintenance (particularly in conservative welfare states). In doing so, they contribute to what we may call *intergenerational path dependency* despite their abilities and agency potential. Thereby they potentially foreclose life course opportunities 'prematurely' – given their skills and agentic potential. Others may opt for upward mobility striving, particularly under conditions and ideologies of liberal welfare states and/or very low social and/or immigrant status, and forgo the comforts of predictability provided by path dependency.

#### 4.4.4. Compensatory advantage

The likelihood of disadvantageous path dependency varies, however, with the various kinds of resources individuals bring along and/or can mobilize. Most important are resources related to the social positioning of the family of origin as well as the social status attained by the individuals themselves. Differences in the negative outcomes of path dependency have given rise to the idea of *compensatory advantage* as proposed by Bernardi (2014). This concept entails that given (educational) trajectories are for those coming from a privileged social background less sensitive to and "dependent on prior negative outcomes" (Bernardi, 2014:75). Put differently, the various kinds of resources to which high-status families or high-status persons have access are helpful to *compensate* the disadvantages associated with path dependency.

#### 4.5. Integrating developmental and societal canalization

In this section, we outline selected general scenarios of developmental and societal canalizations playing out together to illustrate the potential of this interplay.

##### 4.5.1. Compensatory agency overcoming societal constraints

Under conditions of *transparent and expected constraints* inherent in educational or employment institutions, the individual may need to use more focused and failure-resilient goal engagement to reach the goal. Such compensatory efforts can, of course, only work if the constraints are not absolute. Let's take the example of getting admitted to and succeeding in a prestigious university in the U.S. university system. Success in such an ambitious path will be harder to achieve for children from lower SES backgrounds. So an individual agent will need a much greater *selective goal commitment* and more *accumulated personal control perceptions* regarding academic competence than someone from a more privileged background. Youth undertaking such an ambitious endeavor can withstand and overcome set-backs only if they can look back on a string of personal experiences with successfully mastering educational challenges. The implication of such compensatory agency is, of course, that the resources needed to promote success in spite of the SES-related constraints cannot be spent on anything else. So compensatory agency has high costs in terms of non-focused domains of life.

##### 4.5.2. Echo-chambers of social segregation

In societies with SES-segregated neighborhoods (e.g., United States), individuals do not have much opportunity to encounter, be informed and inspired by others who come from different backgrounds and who have different life paths. This effect is enhanced by individuals' tendency to select like-minded others who have similar occupation, income, and interests into their social network. Over time, the selection of contexts and social contacts steers people away from attempting to leave the life path they are already on.

##### 4.5.3. Playing it safe versus taking risks

Compensatory advantage makes it easier for individual agents to take a risk, because there are more resources to fall back onto if things do not go as planned. In contrast, less privileged individuals will need to play it safe to not lose everything. This social-structural advantage can play together with the social inequality of aspirations and over time create an ever amplifying spiral of social disadvantage.

## 5. Conclusions

Lifespan developmental psychologists and life-course sociologists are uniquely positioned to integrate their insights into understanding the dynamic interplay between individual agency, societal institutions and social structure. With the societally structured life course as the field of action, individuals embark on a journey through a landscape of opportunities and constraints for pursuing major life goals. This

epigenetic landscape is strongly age-graded but also reflects differential paths and resources for different social classes. This constitutes path dependency via *institutional and social-structure based canalization*.

At the same time, individual motivation in cycles of goal selection, goal engagement, and goal disengagement and adjustment, also becomes canalized into volitional commitments to selected goals. This is particularly enhanced in long-term developmental processes of specialization, selective growth, coupled with expertise specific self-concepts and shaping of a social network. These long-term processes of individuals' selective optimization constitute path dependencies via *developmental canalization*.

Individuals have the greatest opportunities to make a difference in terms of moving into non-normative paths and compensate for social-class related disadvantage during major transitions that are choice points between different paths leading to very distinct outcomes. The institutionalized life course and the structure of inequality in a society determine the *latitude* of individual agency in breaking path-dependent processes, for example, to achieve social mobility. Individual agency thus is most effective if it manages to exploit the often strongly age-graded opportunities during institutionalized transitions (e.g., after graduating from compulsory school).

Bringing together individuals' developmental canalization and societal canalization can produce either compensatory or amplification effects across life-course time. These phenomena of compensatory, echo-chamber and other agency-society canalization interplays have substantial implications for life-course outcomes particularly in terms of social mobility. They are therefore highly relevant for social policy, and provide a promising ground for future research.

Moreover, researchers could ask under which conditions *institutionalized path dependency is strong*, thus making it harder for individuals breaking through the barrier to an alternative path, eventually engendering cumulative disadvantages. Institutional path dependency is strong, for example, when societies use rules to allocate students to *educational trajectories* that are based on *early transitions* coupled with ability tracking. When educational placement is a function of *previous school performance*, exemplified by the Austrian, German, and Swiss educational systems, students get "locked" in tracks offering unequal learning opportunities, likely to result in processes of cumulative disadvantage (Blossfeld, Buchholz, Skopek & Triventi, 2016; Van de Werfhorst & Mijns, 2010). In the case of Switzerland, the early performance-based tracking in the Swiss educational system at the age of twelve decisively determines young people's entire educational trajectory (Buchmann, Kriesi, Koomen, Imdorf, & Basler, 2016; Steinhoff & Buchmann, 2017).

Another promising topic for future research is to investigate different transitions and different societal conditions in terms of how great a challenge they pose for individual agents. Using our framework, researchers can generate specific predictions for a given societal and historical context about which agency components matter to what degree in which transition and life-course path as these paths are constituted under specific macro-contextual conditions. Certain transitions are navigated best with realistic and well-calibrated aspirations (e.g., applying for the right level of apprenticeship in the Austrian, German or Swiss vocational training system; Heckhausen & Tomasik, 2002), whereas other transitions work out best for those that have extremely, even unrealistically high aspirations (e.g., US after-high school transition). As a consequence, individuals with corresponding individual dispositions (e.g., self-assertion and optimism) will do better, whereas they would fare worse in a societal setting with inverse contingencies. Within canalized paths and between transition points, individual agency resources would have to be formidable to overcome the barriers to other paths (e.g., switch to a different career). Again, these are the constellations when agency and with it individual differences in prudence and planfulness when choosing a goal, and decisiveness and commitment when pursuing a goal, become particularly consequential.

Finally, we could ask under what kinds of societal conditions

extreme individual specialization would be adaptive, and whether it is a promising way to overcome social disadvantage. Extreme path dependency within an individual's life course, for example to allow world-class performance on a musical instrument or in an athletic discipline, come with a high risk for the individual to never make it or become obsolete once the peak biological conditions have waned. This can only be buffered by protective and compensatory societal support, which would have to be based on dedicated, long-term and consistently well-funded societal institutions.

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