

Why Do Different Individuals Progress Along Different Life Trajectories?

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ABSTRACT—*The core marker of progress in psychological science is the degree to which our work enhances the welfare of people. In order to effectively enhance human welfare, we must develop comprehensive models that explain why different individuals progress along different life trajectories. Exciting theoretical accounts that describe transitional processes from gene polymorphisms through moment-to-moment behavior are beginning to emerge. These early accounts highlight opportunities to investigate specific transitional steps along that long pathway, the need to understand the universal and the contextual aspects of psychological processes, and the need to define and measure psychological constructs with more precision and clarity. It is likely that creative new research in each of these areas will bring enormous progress over the coming decade.*

As a clinical psychological scientist, the driving belief that influences my research is this: psychological science contributes knowledge that can be used to improve the welfare of human beings. In the end, the most important marker of the value of what we do is the degree to which advances in psychological knowledge lead to the increased well-being and life success of people. Of course, each psychological researcher need not be guided by this kind of service orientation, but in the end, the ultimate products of our research should be useful to the larger community.

In my view, our success in providing useful knowledge depends heavily on the degree to which clinical psychological science takes full advantage of basic psychological science and, in turn, contributes its insights to basic science. My views on the important questions facing scientific psychology derive from

this point of view. I discuss one important, broad question facing clinical psychological science; addressing it successfully will both require the invocation of advances in basic psychological science and new contributions to basic science.

ONE FUNDAMENTAL TASK FOR CLINICAL PSYCHOLOGICAL SCIENCE

One fundamental task for clinical psychological science is understanding why different individuals progress along different life trajectories; this knowledge is important, in part, to understand the forces that increase the likelihood of successful or unsuccessful life pathways. A basic challenge within that broader goal is to develop probabilistic accounts that specify pathways from, as it were, the beginning (gene polymorphisms)¹ to the end (behavior in the moment). Although it is of course true that one's immediate circumstances play an important role in influencing one's behaviors, it is also true that, as a function of differences in personality, different individuals tend to perceive even similar circumstances differently from one another, and they tend to respond differently to those circumstances (Caspi, 1993). Because this process occurs repeatedly over time, individuals can proceed along different developmental trajectories, in part as a function of early differences in personality and its antecedents.

It is thus crucial that researchers pursue integrative accounts that describe specific, transitional steps along the way. Possible examples include pathways from gene polymorphisms to indi-

¹My characterization of what constitutes "the beginning" and what constitutes "the end" is incomplete, in part because genetic structure is the product of evolution, and this article does not consider the fundamental, defining role evolved propensities likely play in human functioning. I have assumed that role and focused my comments on individual differences in functioning. My characterization is oversimplified in many ways, one of which is that I do not give consideration to the circular or reciprocal nature of many of the processes to which I refer. There is clear evidence that reciprocal processes occur and will need to be considered for comprehensive explanations of life trajectory differences.

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vidual differences in neurotransmitter functions, from neurotransmitter functions to individual differences in the operation of specified brain systems, from brain system operation to temperament, from temperament to personality, and from transactional processes between personality traits and experience to learning. In addition, researchers can explain how learning alters the probability of response choices in moment-to-moment life and describe specific behavioral choices in specific circumstances.

Developing such accounts is perhaps an ambitious goal, but theoretical accounts of such beginning-to-end pathways have recently begun to appear. For example, Cyders and Smith (2008) proposed such a pathway for the emergence of emotion-based dispositions to engage in rash, ill-advised action. Though comprehensive models of such processes are few, researchers are making important progress in clarifying specific transitional steps along the pathway. For example, some researchers have begun to address the first step of relating gene polymorphisms to neurotransmitter levels in key brain systems (e.g., Auerbach, Faroy, Ebstein, Kahana, & Levine, 2001; Beitchman et al., 2006; Hu et al., 2006; Hu et al., 2005; Lakatos et al., 2003), others have begun to address the penultimate step of documenting transactional processes in which personality traits shape the learning process (Caspi, 1993; Caspi, Roberts, & Shiner, 2005; Smith, Williams, Cyders, & Kelley, 2006), and others have begun to address the final step of documenting interactions between traits and circumstances that predict moment-to-moment behaviors in daily life (Lynam, Miller, & Smith, 2007; Mischel, 2004; Mischel, Shoda, & Mendoza-Denton, 2002).

It is also true that programs of research in each of these areas highlight additional challenges that must be faced for this work to prove successful. I would like to emphasize three basic challenges that need to be faced as we describe the ways in which individuals progress along different life trajectories. We need to develop specific, causal theories describing the transitions at each step; we need to clarify which aspects of psychological experience reflect universal psychological processes and which reflect cultural influences; and we need to conduct more precise, valid tests of our theories. I believe that psychological scientists can begin to address these challenges successfully over the coming decade. In the next section, I describe the challenges, their importance, recent efforts to address them, and difficulties in doing so. I conclude by offering thoughts as to the ways in which research might contribute to the achievement of the fundamental task I have described.

THREE CHALLENGES

Specific, Integrative, Causal Theories for Each Step in the Beginning-to-End Sequence

There are, of course, many, many transitional steps between inherited gene structure and an in-the-moment behavioral

choice. One obvious challenge is to identify and define the steps involved. Another is to develop, for each presumed step in the process, specific theories that define how that transitional process takes place. At what age do individual differences in precise personality traits emerge? What processes influence their emergence? How do individual differences in specified brain systems influence the emergence of particular personality traits? How do neurotransmitter interactions influence the operation of those brain systems? To what degree do gene polymorphisms influence neurotransmitter levels, thus contributing to brain system functioning, and thus contributing to personality development? To what degree does emotional trauma influence neurotransmitter levels in key brain systems, thus influencing personality? How do personality traits interact with circumstance to help shape learning? How do learned expectations for the consequences of behavior influence the probability of a given behavioral choice in a given circumstance? What principles describe the nature of the learning–context interaction? When are responses primarily driven by the immediate context, and when are responses more heavily influenced by disposition?

Interesting models have been developed in the basic science literature to address some of these questions. For example, Caspi and colleagues, perhaps following Scarr and McCartney's (1983) discussion of gene–environment interactions, have suggested three kinds of personality–environment transactions that describe ways in which one's traits play a direct role in contributing to the nature of the environment to which one is exposed (Caspi, 1993; Caspi & Roberts, 2001; Moffitt, 2005; Shiner & Caspi, 2003). Evocative person–environment transactions refer to the process in which different individuals evoke different reactions from others. An antagonistic individual is more likely to evoke unfriendly responses from others than is an agreeable person. Proactive transactions refer to the process in which individuals tend to choose environmental settings in which they are comfortable. Reactive transactions refer to the process in which individuals with different trait structures react to the same event differently from each other.

Clinical psychological scientists have begun to take advantage of this work, both by developing more precise theoretical accounts of personality's influence on the emergence of dysfunction (Smith & Anderson, 2001; Widiger & Smith, 2008) and by providing longitudinal evidence supporting the existence of such processes (Caspi, Elder, & Bem, 1987; Fried, Cyders, & Smith, 2008; Ge, Conger, & Elder, 1996; O'Connor et al., 1998; Wong, Zucker, Puttler, & Fitzgerald, 1999).

Most recently, researchers have begun to integrate this theory into more comprehensive accounts of the emergence of different life trajectories. Smith, Williams, et al. (2006) showed that, as a function of personality differences, individuals learned different things (i.e., formed different expectancies) from precisely the same learning event. Because expectancies predict subsequent behavioral choices (Fried et al., 2008; Goldberg, Halpern-Felsher, & Millstein, 2002; Ouellette, Gerrard, Gibbons, &

Reis-Bergan, 1999; Smith, Goldman, Greenbaum, & Christiansen, 1995; Smith, Simmons, Flory, Annus, & Hill, 2007), the finding that traits influence expectancy development may describe part of the pathway of influences on life trajectories.

These promising examples concern investigations into only a small number of the many questions of interest that must be answered if we are to fully understand the development of different life trajectories. There are numerous opportunities for fruitful inquiry available, and researchers currently have the tools necessary to investigate many of them.

This enterprise also involves significant challenges for psychological scientists. One example is the study of gene–behavior relations. On one hand, there has been enormous progress in the biological study of genes. For example, the recognition that, in some cases, alleles (gene forms) are nonrandomly associated even though they exist at different loci, and even on different chromosomes, appears to be vitally important for understanding genotype–phenotype relations (Goldstein & Weale, 2001).

On the other hand, progress in understanding the influence of gene variability on life trajectory variability has perhaps been slowed by a lack of precision in measuring psychological constructs. For example, one common undertaking for clinical researchers is to seek direct connections between a gene polymorphism and a psychological disorder. The difficulty is that psychological disorders, as currently defined, are typically composed of syndromes (i.e., groups of symptoms). Although the initial, guiding assumption was that groups of symptoms that tend to co-occur would have a common cause (Kraepelin 1883/1981), as is often observed with medical diseases, there is in fact very little evidence that this is the case for most psychological disorders.

In fact, there is often direct evidence against that assumption. For example, Jang, Livesley, Taylor, Stein, and Moon (2004) identified 14 subfactors of depression (examples include low positive affect, insomnia, loss of appetite, psychomotor retardation, and feeling blue and lonely). It is interesting to note that intercorrelations among those factors ranged from .00 to .34 and that there were substantially different heritability estimates for the different factors (ranging from .00 to .35). It follows that a single score indicating level of depression must be influenced by the operation of many different psychological constructs, some heritable and some not.

Efforts to relate variability on such a score to variability on a single gene must, necessarily, meet with limited success. A gene polymorphism cannot be expected to relate to variation on several, moderately related psychological constructs. Conceptually and methodologically new methods that emphasize unidimensional, homogeneous constructs for measuring dysfunction are necessary for further understanding of the genetic basis of dysfunction (McGrath, 2005; Smith & Combs, in press; Smith, McCarthy, & Zapolski, in press); I elaborate on this point below. Researchers' pursuit of endophenotypes as intermediaries between genes and behavioral phenotypes will be

more successful to the degree that the target behavioral phenotypes are definable, homogeneous entities. Continued use of the system laid out by the *Diagnostic and Statistical Manual of Mental Disorders (DSM)* will slow progress in this field.

Thus, the development of specific models specifying the transactional processes at different steps in the pathway from genetic makeup to daily behavior is characterized both by the real promise that generative theories are being developed and by many real challenges. One such challenge is that serious conceptual and measurement changes must be made in clinical psychological research to facilitate progress toward the goal I have described. Both the promise and the challenge suggest exciting opportunities for new, crucially important lines of investigation.

Consideration of Universal and Contextual Contributions to Life Trajectories

There are several reasons why understanding variations in life trajectories requires a careful consideration of both universal and cultural or contextual psychological processes; in this article, I mention four. First and most obvious, one cannot assume that models one develops by studying one group apply in the same way to members of other groups. Second, there appear to be complex interactions between universal human characteristics and the psychological demands and opportunities specific to a given culture in the shaping of psychological functioning (Heine, 2003; Smith, Spillane, & Annus, 2006). A failure to appreciate this reality is likely to lead to imprecise and perhaps inaccurate accounts of psychological experience.

Third, in order to understand the degree to which different life trajectories are adaptive, one must consider the context in which the trajectory is played out. Some life trajectories are adaptive in some contexts but not in others. To use one well-researched example, a trajectory characterized by individualistic values and self-promotion is likely to be more adaptive in Western/European cultures than in Eastern/Asian cultures (Heine, Lehman, Markus, & Kitayama, 1999). Fourth (and relating to the previous point), it is important to study the fit between psychological characteristics and cultural contexts. The fit is not always good. We have provided an account of risk for one important form of dysfunction, American Indian problem drinking, that focuses on how contextual factors specific to American Indian reservation life interact with universal psychological propensities to increase risk (Smith, Spillane, & Annus, 2006; Spillane & Smith, 2007).

Psychological scientists have made progress in understanding universal and cultural processes, thanks to advances in defining psychological universals, advances in developing methods for investigating putative universals (Norenzayan & Heine, 2005), and theories specifying relations between universals and cultural processes. Continued progress in this domain may rely, in part, on psychologists' use of advances in fields outside

traditional psychological science. For example, cultural evolutionary theory from anthropology provides well-described, mathematical models of processes within cultures that influence both individual behavior and cultural change (Richerson & Boyd, 2005). Ultimately, integrative accounts that include history, cultural evolution, current cultural characteristics, and psychological processes are likely to be necessary to fully describe individuals' life trajectories.

Valid Theory Testing

I believe recent validity theory writings have identified an important problem plaguing many tests of psychological theories, implying that many theory tests may suffer from a fundamental lack of clarity (Edwards, 2001; Hough & Schneider, 1995; McGrath, 2005; Schneider, Hough, & Dunnette, 1996; Smith & Combs, in press; Smith et al., 2003; Smith & McCarthy, 1995; Smith et al., in press; Smith & Zapolski, 2009; Strauss & Smith, 2009). To the degree that there is a lack of coherence in some theory tests, our ability to develop valid accounts of pathways to life trajectories may be compromised.

The core issue is this: Researchers often use single scores to reflect variability on measures that are demonstrably or possibly multidimensional. When one correlates total scores of a multidimensional measure with scores on another measure, one builds two sources of uncertainty into one's test. First, with a single score, one cannot know the nature of the different dimensions' contribution to that score. It is quite possible that such a correlation reflects an average of strong and weak relationships between the different dimensions and the other measure. Mathematically, one cannot know the meaning of a single score representing a multidimensional measure (McGrath, 2005).

The second problem is perhaps more severe than the first. It is not just that a composite score averages the functioning of separate constructs in its association with measures of other constructs, it is that the same composite score likely will reflect different combinations of construct scores for different individuals in a sample. The same score on depression could reflect very low levels of positive affect but no sleep difficulties for one person and average levels of positive affect and insomnia for another. Because the different factors of depression are so modestly intercorrelated, one has no firm basis for understanding the meaning of a single, overall score for an individual (this problem permeates psychological diagnosis; Smith & Combs, in press; Smith et al., in press).

It follows that a correlation of one such set of scores with scores on other measures will lack coherence. Thus, efforts to chart pathways of influence on life trajectories that result in depression can easily lack theoretical clarity. To say that a gene polymorphism is related to depression is imprecise; one must instead describe relations between gene polymorphisms and homogeneous, unidimensional constructs that are implicated in

a diagnosis of depression. Doing so will not only increase the clarity of theory tests; it may facilitate the discovery of relationships that had previously been obscured. If the presence or absence of a certain gene allele influences endophenotypes contributing to positive affect, but does not influence endophenotypes contributing to negative affect, sleep, or psychomotor speed, one is likely to miss that relationship if one represents the behavioral phenotype as an overall depression score.

In summary, to develop comprehensive explanations of why humans progress along different life trajectories, researchers need to specify and test precise theories for individual steps along the long pathway from genes to moment-to-moment behavior; they need to understand which aspects of psychological functioning represent universal human characteristics and which are culturally and/or contextually specific; and they need to focus their theory testing efforts on definable, homogeneous, unidimensional psychological constructs.

I have described what I believe to be an important goal for psychological science—the development of comprehensive explanations for why humans progress along different life trajectories—and I have considered a sample of important challenges to be addressed in the pursuit of that goal. I conclude by offering my views on three tasks the field should emphasize more in order to bring us closer to the goal.

THREE TASKS

Psychological Researchers Need to Inform Genetic and Biological Researchers

Genetics research technology has advanced remarkably rapidly—today, researchers can get extraordinary amounts of information from a single gene. Advances in psychological research, not in genetics research, are necessary for significant advances in gene–behavior relations. A crucial challenge facing psychological researchers is the development of sound theories and precise measures of coherent, homogeneous, elemental psychological constructs. To the degree that psychology exports measures of complex, multidimensional constructs to biology, the quest to understand the genetic underpinnings of behavior will be slowed. A huge growth industry over the coming few decades will be the identification of homogeneous constructs and the development of measures of them. That work will play an essential role in the goal of describing individual differences in life trajectories.

Multiple Methods of Studying the Transactional Processes That Shape Life Trajectories

Psychological scientists have interesting, compelling theories describing some aspects of the transactional processes that influence development. I believe the field needs new, creative methods for testing the validity of those theories. Longitudinal

studies are profoundly important, and those that have been done have proven remarkably informative (e.g., Caspi et al., 1987; Ge et al., 1996). But such studies do, of course, face limits in the number of variables they study. Perhaps psychological science can recruit alternative methods of modeling complex processes available from other disciplines.

For example, computer simulation methods have been used in several other disciplines to help address the complexity of objects of inquiry. Complex simulations have been used to model carbon and nitrogen biogeochemistry to avoid soil degradation in Chinese farming (Tang, Qiu, Van Ranst, & Li, 2006); ocean-atmosphere general circulation processes with interactive sea ice to investigate global warming (Covey, Gleckler, Phillips, & Bader, 2006); responses of hurricanes to global warming (Chauvin, Rouer, & Deque, 2006); and political stability, political conflict, and aggression between competing political entities (Lustick, 2002). Each of these examples involves modeling processes that (a) are too complex to represent fully in traditional longitudinal research and (b) include causal hypotheses that cannot be tested by usual experimental manipulation. Some research of this kind is well under way in psychology (e.g., Goldstone & Janssen, 2005; Kenrick, Li, & Butner, 2003), and I believe there is tremendous potential for this approach to be applied more broadly in psychological science, thereby providing information not otherwise available. I anticipate that researchers will develop other novel methods for theory testing.

New Methods for Describing Psychological Dysfunction

The classic psychiatric system for describing psychological dysfunction, the *DSM*, is based on Kraepelin's (1883/1981) hypothesis that there are syndromes of dysfunction characterized by groups of symptoms with a common cause. One hundred years later, it has become quite clear that this model does not effectively describe psychological dysfunction. Many putative disorders consist of sets of moderately or weakly related symptoms that often appear to have different etiologies from each other (Smith & Combs, in press; Smith et al., in press), and individuals with the same disorder can have very different symptom pictures (Widiger & Trull, 2007). One result, referred to earlier in this article, is that theory tests concerning dysfunction are often compromised due to a lack of precise, valid measures of dimensions of functioning.

To the degree that the *DSM* system continues to rely on the archaic syndrome approach, it should not be used as a basis for clinical science research. For researchers to develop valid descriptions of the factors influencing adaptive and maladaptive life trajectories, they must rely on coherent, homogeneous, meaningful dimensions of functioning. Psychological researchers who develop new descriptive systems, perhaps characterized by a parsimonious set of basic dimensions of functioning in combination with content specific concerns (Combs & Smith, in

press; Widiger & Trull, 2007), will make an important contribution to clinical science.

SUMMARY

My contention is that the most important contribution psychological science can make is to improve peoples' well-being. To that end, one central challenge facing scientific psychology is the development of comprehensive accounts of why humans progress along different life trajectories. To meet that challenge, researchers need to develop and test specific, integrative theories describing the transactional processes at each of the many steps from initial genetic makeup to daily behavior. To enhance the accuracy of their theories, they need to develop more precise understandings of which aspects of psychological processes represent universal adaptations and which are culturally and contextually specific. They need to develop more sound means of theory testing, with a particular emphasis on defining and measuring coherent, definable, homogeneous psychological constructs. To facilitate achieving these goals, psychological scientists need to provide genetics researchers with improved and more precise tools for studying phenotypes; they need to expand their repertoire for modeling complex, interactive developmental processes; and they need to develop a new, more valid system for describing dysfunction.

This is an extraordinarily exciting time to be engaging in clinical psychological science. Enormous progress has been made in each of the areas I have discussed; that progress gives one a feel for what future, comprehensive accounts of life trajectory development may look like. It is also true that this progress highlights the many interesting lines of inquiry yet to be undertaken. I believe the progress we will see in the coming decade or two will vastly exceed what we have seen so far. The result will be continued psychological contributions to the improvement of the welfare of persons.

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