# 发展心理学新进展 in Developmental Psychology

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**心理学新进展影印丛书**

美国心理学会（APS）组编

# Current Directions in Developmental Psychology

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# 出版说明

“心理学新进展影印丛书”由北京师范大学出版社从培生教育出版集团引进出版，包括《普通心理学新进展》《发展心理学新进展》《认知心理学新进展》《社会心理学新进展》《人格心理学新进展》《健康心理学新进展》《变态心理学新进展》共 7 册英文影印图书，全部由美国心理学会（APS）组编，撰写者均为心理科学各自研究领域的世界著名学者和专家。入选的文章代表了各心理学分支自 2000 年以来的最新研究成果，同时各册所涉及的主题也全面体现了该分支学科的研究动态。

作为北京师范大学出版社成立 26 年以来第一批英文原版影印图书，我们真诚希望“心理学新进展影印丛书”的出版，可以为中国广大心理学研究者、教师以及相关专业的研究生，带来国际心理学界近十年的综合发展趋势，从研究思路、概念界定、研究方法与设计、统计技术以及未来的研究方向等方面，国内的学者能够及时把握到国际同行的关注热点，并感受到他们对传统理论的挑战与创新。

在各册图书中，既包括文献综述、对已有研究的质疑，也结合了先进的实验手段、技术和其他学科的综合知识，研究更多地关注和探索心理现象机制层面的复杂原因。每册均有问题思考，以启发学者们深入思索今后的研究热点和可能产生实质性飞越的突破口。

为便于读者阅读，我们特别邀请了北京师范大学心理学院的申继亮教授作为丛书审校专家，各册分别由北京师范大学的青年学者加入了简要的中文进行导读，同时还评价了研究的优缺点。

此套丛书可以作为各高校教师开设心理学新进展课程或专题讲座的教学用书，同时可以作为相关领域的研究人员发表文献综述的内容依据，尤其还适合作为心理学专业英语课程的教材进行学习和讨论。

# Contents

[导读]

# 第一编　生物学：遗传学和神经科学

生物学、神经科学以及遗传学的新进展已经在心理学多个领域的研究中受到关注。尤其是现代科学对基因和脑的研究有长足进步，可以探究到基因和脑的结构及功能，这有助于心理学家理解基因和脑在行为发展中的作用。例如，基因图谱的研究，使人们广泛接受了“绝大部分的行为差异都受基因影响”的观点。此外，神经科学方面的发展，也让我们认识到大脑与认知、情绪及行为发展之间的关系。

这部分所收录的文章呈现了生物学、神经科学和遗传学等学科的最新研究成果，这些研究成果告诉我们：在行为和发展过程中，生物与环境的影响作用是相当复杂的。

Danielle Dick 和 Richard Rose 的文章，向我们介绍了新的研究设计，通过这些设计，研究者可以探讨先天因素的发展变化、遗传和环境影响作用的大小等。这些方法还有助于探讨基因与环境之间不同的关系模式和交互模式，同时有助于研究不同的行为在多大程度上是由共同的基因影响的。作者还谈到未来应如何把行为遗传学和分子遗传学相结合，以扩充人类对行为差异原因的认识。

Brian Klob、Robin Gibb 和 Terry Robinson 的文章给我们介绍了一个有关大脑组织的新观点。虽然我们已经知道大脑具有可塑性（可以随着经验发生持续性的变化），但近来的研究发现，大脑可塑性和行为同时受出生前和出生后各种因素的影响。药物、激素、营养、压力和年龄等都只是影响大脑组织的其中一些因素。新研究不仅让我们更深刻地理解问题行为的发展过程，并且告诉我们如何预防和治疗。

John Columbo 的文章向我们介绍了婴儿注意力研究中的新动向。注意被看做是研究婴儿和早期儿童认知能力发展的重要工具，而且此类研究都是以比较器理论（comparator theory，即简单编码）为基础的。然而，目前有关注意的研究以大量融合了认知神经科学的模型和理论为基础，这些模型和理论给该领域带来很多新的启示。认知神经科学研究者在研究中同时使用注意过程中的行为和心脏生物指数，或者对一些成人常用的任务进行修改，用于婴儿身上，从而探讨婴儿控制和调节注意神经回路。采用多种方法，Columbo 和他的同事可以更好地了解婴儿注意（更具体地说，婴儿注视）与低水平视觉通路成熟程度之间

的关系。

最后一篇文章是由 Linda Patia Pear 完成的，文章讨论了青少年性格和大脑变化之间的关系。青少年期的一些典型行为问题（如冒险行为增加），被看做是由青春期激素水平升高造成的。大脑研究出现之后，揭示了青少年前额叶变化与行为之间的关系。尤其是，大脑边缘系统和多巴胺输入系统在青春期会发生明显变化，多巴胺输入系统对压力源特别敏感。大脑边缘系统和多巴胺输入系统，还构成了调节药物和其他强化刺激的动力作用的神经回路的一部分。这些变化直接导致了青春期的特殊行为方式。相关的研究使我们对青少年的大脑有了重新的认识，他们是完全有别于儿童和成人的大脑的，所以我们也无须再对青少年人的特殊行为感到诧异。新的研究途径可以让我们更深刻地认识青少年和成人药物滥用的开始及持续的原因。总的来说，为了真正地理解大脑与行为的关系，还需要多学科合作的努力。

通过这些文章，我们可以发现，生物学、遗传学和神经科学给科学家们带来很多新的启发，而且应该进一步的结合，运用到发展心理学研究中。

# Biology: Genetics and Neuroscience

In the various fields of scientific psychology, there has been a significant amount of attention paid to recent advances in biology, neuroscience and genetics. More specifically, modern science has allowed for a more in-depth examination of the role of genes and brain structure and function in behavioral development. For example, results of studies using gene mapping have led to the widespread acceptance that nearly all behavioral variation reflects some genetic influence. In addition, advances in neuroscience have increased our understanding of the relations between the brain and cognitive, emotional and behavioral development.

The articles in this section represent some of the most recent findings from biology, neuroscience, and genetics, and together show that the combined influences of both biology and environment on behavior and development are complex. In the article by Danielle Dick and Richard Rose, we see how new research designs are allowing for the exploration of the developmental changes in the nature and magnitude of genetic and environmental effects. These new approaches can also help to shed light on the extent to which different behaviors are influenced by common genes, as well as different forms of gene-environment correlation and interaction. The authors also present their view of how the integration of behavioral and molecular genetics will enhance our knowledge of behavioral variation in the future.

In the article by Brian Kolb, Robin Gibb and Terry Robinson, a new view of the organization of the brain is presented. While we have been aware that the brain shows plasticity (changing constantly as a function of experience), recent research shows that both brain plasticity and behavior can be influenced by a variety of both prenatal and postnatal factors. Drugs, hormones, diet, stress and aging are only some of the factors that can influence brain organization and lead to changes in behavior and development. This new research will not only provide a deeper understanding of development, but will also inform prevention and treatment efforts.

In the article by John Columbo, we are introduced to the recent changes in the study of attention in infancy. Attention has been regarded as a major tool for studying the development of cognitive skills in infancy and early childhood, and had been guided by comparator theory (i. e. simple encoding). However, more recent integrations of the theory and methods involved in the study of attention with models in the field of cognitive neuroscience have led to important implications for this area. Researchers in cognitive neuroscience use both behavioral and cardiac indices of attention or adapt tasks that have been shown with adults to be associated with the brain pathways that control or mediate attention. Using a similar approach, Columbo and his colleagues were able to better understand variations in infant attention (more specifically, infant looking) as being linked to the maturation of lower-order visual pathways. Columbo asserts that much of the extant research may need to be interpreted within a new framework that relies on a cognitive neuroscience approach.

In the last article by Linda Patia Spear, the link between adolescent characteristics and brain changes is discussed. Some typical behaviors of the adolescent period (increased risk-taking, for example) have been thought to be influenced by the hormonal changes of puberty. New brain research is emerging that elucidates the link between the alterations in the prefrontal cortex during adolescence and behavior. Specifically, the adolescent brain undergoes a transformation in the limbic brain areas and their dopamine input—systems that are sensitive to stressors. These systems also form part of the neural circuitry that modulates the motivational value of drugs and other reinforcing stimuli. This research has led to a recognition that the brain of the adolescent is markedly different from the younger or adult brain, and therefore the behaviors that are specific to adolescents are not surprising. This avenue of research can lead to important insights into the factors that precipitate and maintain both adolescent and adult drug and alcohol use. Overall, multidisciplinary research efforts need to be undertaken in controlled settings for a true understanding of the brain/behavior link.

Taken together, these articles make it clear that the fields of biology, genetics and neuroscience are critical in informing scientists and should be integrated into future research in developmental psychology.

[导读]

# 行为遗传学：新进展及趋势

行为遗传学有些什么新内容？随着“绝大部分行为差异都受某种基因的影响”这一观点得到普遍认同，目前的研究正在考察先天因素的发展变化、遗传与环境影响的大小等问题，同时还探讨不同的行为在多大程度上受共同基因影响，基因与环境之间不同的关系模式和交互模式等问题。新的研究设计有两点有别于过去，一是对相同家庭环境或居住环境中的无血缘关系儿童进行测查；二是在可提供大量遗传信息的设计中采用环境变量。通过这两点，我们可以更清楚了解相同的环境对行为产生的影响。

作者从发展的角度，提出有的变化在整个发展期是稳定的，有的是会改变的。许多不同的行为变量受相同的基因控制。从遗传—环境的相关和交互模式看，在不同社会中，遗传特性可能因环境变量发生明显变化。个体的基因与生活的环境背景相互作用，这个过程不是被动的，遗传特质可以使一个人选择甚至是创造他的环境。比如，在选择朋友时，人们的遗传特质就起了作用。人们喜欢和自己相似的人，同卵双生子在同班同学中选择朋友就高度类似。传统的行为遗传学研究中没有测量环境的影响，而今，新方法把环境变量测量整合到遗传信息中，从而为研究并确定环境影响作用提供了强有力的支持。另外，本文作者曾选取 11 ~ 12 岁同性别的双胞胎和与每一个双胞胎孩子匹配的同班级同年龄同性别的孩子为被试，对双胞胎之间（co-twin）、每一个双胞胎孩子与其匹配的同学间（T—C），两个相匹配同学间（C—C）进行比较，从而可以比较基因、家庭以及学校对儿童行为的影响作用。

行为遗传学未来的趋势是怎样的呢？研究者们将采用行为遗传学的技术和方法，力图发现那些行为障碍的易感基因和造成行为差异的关键基因。行为遗传学和分子遗传学的结合，有助于找到影响特定行为差异的基因，并且弄清发生作用的原理。心理学家向公众宣传这些新知识的过程中扮演着相当重要的角色，同时还需要促进人们对不可避免的伦理问题进行思考。

# Behavior Genetics: What's New? What's Next?

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## Abstract

What's new in behavior genetics? With widespread acceptance that nearly all behavioral variation reflects some genetic influence, current studies are investigating developmental changes in the nature and magnitude of genetic and environmental effects, the extent to which different behaviors are influenced by common genes, and different forms of gene-environment correlation and interaction. New designs, focused on assessment of unrelated children in the same households or neighborhood environments, and use of measured environmental variables within genetically informative designs, are yielding more incisive evidence of common environmental effects on behavior. What will be next? Behavior genetic techniques and analyses will be used to inform efforts to find genes altering susceptibility for disorder and dispositional genes affecting behavioral variation. The developing integration of behavioral and molecular genetics will identify genes influencing specific behavioral variation and enhance understanding of how they do so. Psychologists will play a pivotal role in communicating that understanding to the public and in facilitating consideration of the inevitable ethical issues then to be confronted.

## Keywords

behavior genetics; molecular genetics; development; gene-environment interaction

Through most of its brief history, behavior genetics had a single and simple goal: to demonstrate that some of the variation in behavior is attributable to genetic variance. Now, a diverse array of behaviors has been investigated with twin and adoption designs, yielding evidence that genetic variation contributes to individual differences in virtually all behavioral domains (McGuffin, Riley, & Plomin, 2001). Is behavior genetics, then, a thing of the past, a field whose success makes it obsolete? Not at all: never has behavior genetic research held more promise. Investigators now possess analytic tools to move from estimating latent, unmeasured sources of variance to specifying the genes and environments involved in behavioral development, and the ways in which they interact. Our modest aim in this essay is to describe the questions now asked by behavior geneticists and to sketch the role that the field will assume in the merging era of behavioral genomics.

## A DEVELOPMENTAL PERSPECTIVE

Traditional behavior genetic analyses divide observed behavioral variance into three unobserved (latent) sources: variance attributable to genetic effects, that due to environmental influences shared by siblings (e. g., family structure and status), and that arising in unshared environmental experience that makes siblings differ from one another. Estimates of the magnitude of these genetic and environmental effects are usually obtained from statistical path models that compare identical twins, who share all their genes, with fraternal twins, who like ordinary siblings, on average, share one half their genes. Behavior genetic research now identifies developmental changes in the importance of genetic dispositions and environmental contexts in accounting for individual differences in behavior. Such changes can be dramatic and rapid. For example, we assessed substance use in a sample of adolescent Finnish twins on three occasions from ages 16 to 18 1/2; we found that genetic contributions to individual differences in drinking frequency increased over time, accounting for only a third of the variation at age 16, but half of it just 30 months later (Rose, Dick, Viken, & Kaprio, 2001). Concurrently, the effects of sharing a common environment decreased in importance. Interestingly, parallel analyses of smoking found little change in the importance of genetic and environmental effects, illustrating the trait-specificity of gene-environment dynamics: some effects are stable across a developmental period; others change.

## DIFFERENT BEHAVIORS, SAME GENES?

It is well known that certain behaviors tend to co-occur, as do certain disorders, but the causes of such covariance are much less understood. Behavior genetic models assess the degree to which covariation of different disorders or behaviors is due to common genetic influences, common environmental influences, or both. An example can be found in the significant, albeit modest, correlations observed between perceptual speed (the minimum time required to make a perceptual discrimination, as assessed with computer display methods) and standard IQ test scores (Posthuma, de Geus, &

Boomsma, in press); those correlations were found to be due entirely to a common genetic factor, hypothesized to reflect genetic influences on neural transmission. Another example is found in our study of behavioral covariance between smoking and drinking during adolescence. Genes contributing to the age when teens started smoking and drinking correlated nearly 1.0 (suggesting that the same genes influence an adolescent's decision to begin smoking and to begin drinking), but once smoking or drinking was initiated, genes influencing the frequency with which an adolescent smoked or drank were quite substance-specific, correlating only about 0.25.

## GENE-ENVIRONMENT INTERACTION AND CORRELATION

The interaction of genes and environments has been difficult to demonstrate in human behavioral data, despite consensus that interaction must be ubiquitous. New behavior genetic methods are demonstrating what was long assumed. These methods use information from twins who vary in specified environmental exposure to test directly for the differential expression of genes across different environments. For example, genetic effects played a larger role in the use of alcohol among twin women who had been reared in nonreligious households than among those who had been reared in religious households (Koopmans, Slutske, van Baal, & Boomsma, 1999). Similarly, we found greater genetic effects on adolescent alcohol use among Finnish twins living in urban environments than among those living in rural environments (Rose, Dick, et. al., 2001).

These demonstrations of gene-environment interaction used simple dichotomies of environmental measures. But subsequently, we explored underlying processes in the interaction effect of urban versus rural environments by employing new statistical techniques to accommodate more continuous measures of the characteristics of the municipalities in which the Finnish twins resided. We hypothesized that communities spending relatively more money on alcohol allow for greater access to it, and communities with proportionately more young adults offer more role models for adolescent twins, and that either kind of community enhances expression of individual differences in genetic predispositions. And that is what we found: up to a 5-fold difference in the importance of genetic effects among twins residing in communities at these environmental extremes (Dick, Rose, Viken, Kaprio, & Koskenvuo, 2001), suggesting that the influence of genetic dispositions can be altered dramatically by environmental variation across communities.

Analysis of gene-environment interaction is complemented by tests of gene-environment correlation. Individuals' genomes interact with the environmental contexts in which the individuals live their lives, but this process is not a passive one, for genetic dispositions lead a person to select, and indeed create, his or her environments. Perhaps the most salient environment for an adolescent is found in the adolescent's peer relationships. In a study of 1,150 sixth-grade Finnish twins, we (Rose, in press) obtained evidence that they actively selected their friends from among their classmates. This result is consistent with the inference that people's genetic dispositions play some role in their selection of friends. People like other people who are like themselves, and genetically identical co-twins make highly similar friendship selections among their classmates.

## MEASURING EFFECTS OF THE ENVIRONMENT IN GENETICALLY INFORMATIVE DESIGNS

In traditional behavior genetic designs, environmental influences were modeled, but not measured. Environmental effects were inferred from latent models fit to data. Such designs understandably received much criticism. Now behavior geneticists can incorporate specific environmental measures into genetically informative designs and, by doing so, are demonstrating environmental effects that latent models failed to detect. Thus, we have studied effects of parental monitoring and home atmosphere on behavior problems in 11-to 12-year-old Finnish twins; both parental monitoring and home atmosphere contributed significantly to the development of the children's behavior problems, accounting for 2% to 5% of the total variation, and as much as 15% of the total common environmental effect. Recent research in the United Kingdom found neighborhood deprivation influenced behavior problems, too, accounting for about 5% of the effect of shared environment. Incorporation of specific, measured environments into genetically informative designs offers a powerful technique to study and specify environmental effects.

In other work, new research designs have been used to directly assess environmental effects in studies of unrelated children reared in a common neighborhood or within the same home. We have investigated neighborhood environmental effects on behavior in a large sample of 11-to 12-year-old samesex Finnish twins. For each twin, we included a control classmate of the same gender and similar age, thus enabling us to compare three kinds of dyads: co-twins, each twin and his or her control classmate, and the two control classmates for each pair of co-twins. These twin-classmate dyads were sampled from more than 500 classrooms throughout Finland. The members of each dyad shared the same neighborhood, school, and classroom, but only the co-twin dyads shared genes and common household experience. For some behaviors, including early onset of smoking and drinking, we found significant correlations for both control-twin and control-control dyads; fitting models to the double-dyads formed by twins and their controls documented significant contributions to behavioral variation from nonfamilial environments—schools, neighborhoods, and communities (Rose, Viken, Dick, Pulkkinen, & Kaprio, 2001).

A complementary study examined genetically unrelated siblings who were no more than 9 months apart in age and who had been reared together from infancy in the same household. An IQ correlation of 0.29 was reported for 50 such dyads, and in another analysis, 40 of these dyads were only slightly less alike than fraternal co-twins on a variety of parent-rated behaviors (Segal, 1999). Clearly, appropriate research designs can demonstrate effects of familial and extrafamilial environmental variation for some behavioral outcomes at specific ages of development.

## INTEGRATING BEHAVIOR AND MOLECULAR GENETICS[2]

Where do the statistical path models of behavior geneticists fit into the emerging era of behavioral genomics (the application of molecular genetics to behavior)? In the same way that specific, measured environments can be incorporated into behavior genetic models, specific information about genotypes can be included, as well, to test the importance of individual genes on behavior. Additionally, the kinds of behavior genetic analyses we have described can be informative in designing studies that maximize the power to detect susceptibility genes. Many efforts to replicate studies identifying genes that influence clinically defined diagnoses have failed. Those failures have stimulated the study of alternatives to diagnoses. When several traits are influenced by the same gene (or genes), that information can be used to redefine (or refine) alter-