

What gene–environment interactions can tell us about social competence in typical and atypical populations

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Abstract

Social competence is a complex human behaviour that is likely to involve a system of genes that interacts with a myriad of environmental risk and protective factors. The search for its genetic and environmental origins and influences is equally complex and will require a multidimensional conceptualization and multiple methods and levels of analysis. Behavioural genetic research can begin to address the fundamental yet complex question of how children develop social competence by uncovering the various influences on social development and disentangling variance due to multiple genes, environments and experiences. In this paper, we review the current status of research on sociability, face recognition, emotion recognition, and theory of mind (TOM)—well defined and measured constructs that are likely to be useful indices for detecting genetic and environmental influences on social competence. We also propose specific milestones as indices of further progress in the field: the development of an operational definition of the construct of social competence, the identification of social endophenotypes—psychological processes that are validly and reliably measured components of social competence, and improving specificity and homogeneity with regard to social endophenotypes within a population of study by employing ‘extreme social phenotypes’. These efforts will lead to a better understanding of the specific contributions to the normal variation of social competence in the general population as well as to atypical social development.

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1. Introduction

The fundamental yet complex question of how children develop social competence requires a multidisciplinary approach that considers multiple variables, methods and levels of analysis. Social scientists are at an important juncture whereby they can capitalize on key advances in genetics, neuroscience, psychology and behavioral ecology in their quest to conceptualize and study complex and multidimensional abilities such as social competence. For example, advances in mapping the human genome promises unprecedented possibilities for discovering normal and aberrant genes and associated proteins involved in brain tissue development. Extraordinary innovations in measuring the structural and functional properties of the brain

have contributed to mapping connections between psychological processes and their neurophysiological correlates. Developments in constructivist thought (e.g., Bruner, 1988, 1996; Piaget, 1929) have led to refinements in conceptualizing the mind and amassed substantial empirical evidence that humans are active interpreters of their environment. Social constructivist and contextualist revelations (e.g., Vygotsky, 1934; Wertsch, 1999) that the essentially human aspects of mind (i.e., language and higher order thought) develop through human relationships as children interact with people, objects, and events in socio-cultural contexts have highlighted the dynamic and transactional nature of typical and atypical development (Chapman, 1991; Sameroff & Chandler, 1975). Human relationships are further shaped by prevailing beliefs, values, and social policies within specific social ecologies (e.g., neighborhoods, communities, schools) (Bronfenbrenner, 1979, 2000). Behavioural genetic research exemplifies the type

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of study that can begin to uncover these various influences on development and disentangle variance due to multiple genes, environments and experiences.

In this paper, we propose that a behavioural genetic approach that considers the dynamic interplay between multiple genes and environments is needed to address the question of how children develop social competence. We begin by providing a conceptual framework for social competence that incorporates multiple processes that are hierarchically organized and contextually embedded. The polygenic model of inheritance is proposed to account for the multiple genetic and environmental factors that synergistically contribute to the development of social competence. Within this framework, polygenes associated with social competence would be influenced significantly by environmental factors and contribute to only a small proportion of the overall variance in this behaviour in the normal population. A developmental psychopathology perspective is needed to increase the discriminative power of the phenotype of social competence. One strategy involves identifying potential endophenotypes that refine the definition of the construct of social competence. We review genetic studies on sociability, face recognition, emotion recognition, and theory of mind (TOM)—endophenotypes that are well defined and measured and likely to be useful indices for detecting genetic and environmental influences on social competence. Another strategy focuses on defining the group of study more precisely. We discuss the benefits of employing ‘extreme social phenotypes’ such as the unusual sociability observed among individuals with William’s syndrome to flesh out the specific contribution of key processes such as sociability in the normal variation of social competence in the general population.

2. Defining the construct of social competence

Social competence is conceptualized as an emergent property of the dynamic interplay between characteristics of individuals and their environments (Guralnick, 1996; Rose-Krasnor, 1997; Sameroff, Seifer, & Bartko, 1997; Wyman, Sandler, Wolchik, & Nelson, 2000). In Fig. 1 we depict a hypothetical model of social competence that

focuses on specific cognitive and social abilities. Within this framework, social competence is thought to involve the active and skillful coordination of multiple processes and resources available to the child to meet social demands and achieve social goals in a particular type of social interaction (e.g., parent–child, peer relations) and within a specific context (e.g., home, school).

Basic sensory/perceptual, cognitive, and emotion processes (i.e., attention, memory, motivation) are fundamental to the development of higher-order social abilities. Sociability and the abilities to recognize faces, emotions and understand that others’ thoughts and feelings are different from one’s own are only a few of the higher-level social abilities involved in the development of social competence. Each of these abilities is a necessary building block of social competence. However, these abilities are not sufficient for socially competent behaviour to emerge. A child must be able to coordinate their social abilities along with available contextual resources to meet developmental goals in an adaptive way. Higher-order coordination of social abilities is a critical component of social competence because it permits the child to appropriately match their social goals with the demands of the social context (Bost, Vaughn, Washington, Cielinski, & Bradbard, 1998; Guralnick, 2005; Rose-Krasnor, 1997). Accordingly, social competence entails the development of appropriate strategic processes (i.e., tools) and resources to tackle the social demands of a particular task in given context. Social learning through mediation and scaffolding experiences will likely influence the development of the strategies or ‘tools’ that are particularly useful or meaningful within a particular socio-cultural context. Thus, the beliefs and practices of parents and other relevant agents of social mediation will play a significant role in shaping social competence.

Social competence is both a developmental phenomenon that can be measured over the course of a child’s development (i.e., ontogenesis) as well as a characteristic of a particular social encounter where the time scale is in the order of seconds/minutes (i.e., microgenesis). Thus, continuities and discontinuities in the development of social competence are expected as children are better able to coordinate abilities and take advantage of resources with increasing age but may be less competent at certain developmental stages or in specific social contexts. With any individual child, there is likely to be variation in social competence overtime and across contexts. However, within the general population, some children will show more consistently adaptive or maladaptive social behaviour in various social situations and over the course of their development.

3. Multiple genes and environments for social competence

Nature (genetics) and nurture (environments) effects on development are often described as additive and emanating from separate and independent influences despite considerable empirical evidence that the process is best characterized as dynamic, synergistic and interdependent (Plomin

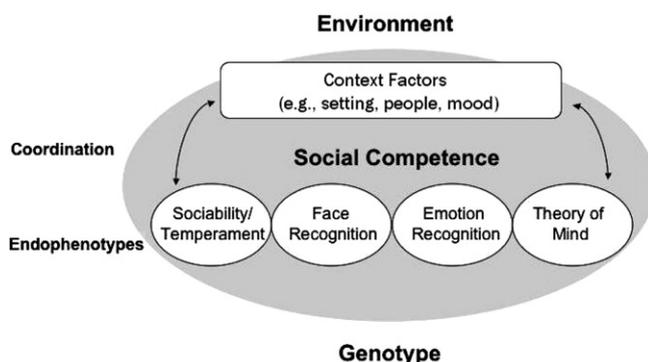


Fig. 1. A hypothetical model of social competence.

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