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Brief Report

Young children's agent-neutral representations of action roles



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ABSTRACT

Recent developmental research has shown that young children coordinate complementary action roles with others. But what do they understand about the logical structure of such roles? Do they have an agent-neutral conception of complementary action roles, grasping that such roles can be variably filled by any two agents or even by one agent over time? Accordingly, can they make use of such representations for planning both their own and others' actions? To address these questions, 3- and 4-year-olds were introduced to an activity comprising two action roles, A and B, by seeing either two agents performing A and B collaboratively or one agent performing A and B individually. Children's flexible inferences from these demonstrations were then tested by asking them later on to plan ahead for the fulfillment of one of the roles either by themselves or by someone else. The 4-year-olds competently drew inferences in all directions, from past individual and collaborative demonstrations, when planning how they or someone else would need to fulfill the roles in the future. The 3-year-olds, in contrast, showed more restricted competence; they were capable of such inferences only when planning in the immediate present. Taken together, these results suggest that children form and use agent-neutral representations of action roles by 3 years of age and flexibly use such representations for episodic memory and future deliberation in planning their own and others' actions by 4 years of age. The findings are discussed in the broader context of the

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development of understanding self–other equivalence and agent-neutral frames of references.

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Introduction

Many if not most everyday human activities are complex actions comprising different complementary parts or roles. Making a sauce hollandaise, for example, involves (among other things) the two complementary roles of pouring melted butter into a pot with egg yolk and whipping the resulting mixture. Performing “The Times They Are A-Changin’” involves three roles: singing, playing the guitar, and playing the harmonica.

Children begin to engage in complex activities involving different roles individually from the second year of life onward, particularly in their problem solving where they integrate different action roles (e.g., removing a cloth, grasping the object hidden underneath) in means–ends relations (e.g., [Chen & Siegler, 2000](#); [Willatts, 1985, 1999](#)). Similarly, slightly later children also begin to engage in cooperative activities with complementary role structure ([Brownell, 2011](#); [Brownell, Ramani, & Zerwas, 2006](#); [Tomasello & Hamann, 2012](#); [Warneken, Chen, & Tomasello, 2006](#)). Examples include joint problem solving in which one person operates one part of an apparatus so that the other person can retrieve some reward ([Warneken et al., 2006](#)). At around this time, children also begin to learn about complementary action roles in so-called “role reversal imitation” ([Carpenter, Tomasello, & Striano, 2005](#)); when they are shown how to perform one action role, A, in a coordinated activity with a partner performing the complementary role, B, they learn about A by firsthand experience but also learn about B by observation—as indicated in their capacity to imitate both A and B later on.

But what this leaves unclear is what exactly children *understand* about the logical structure of action roles. The studies on early coordination and role reversal might be taken to suggest that even toddlers understand action roles in adult-like ways. However, empirically the situation seems to be more complicated; it is not until much later that children reveal competence in coordinating complementary action roles when the situation is not largely scaffolded by adults ([Ashley & Tomasello, 1998](#); [Fletcher, Warneken, & Tomasello, 2012](#)). Relatedly, from a theoretical point of view, what remains unclear is what types of representations underlie children’s tracking of action roles. It is an essential feature of such roles that they are *agent neutral*; like variables that can be assigned different values, roles can be filled by different agents such that a role remains the same regardless of who fills it (and thus is neutral regarding its filler). Crucially, for a large class of activities with complementary roles,¹ agent neutrality means not only that each role can be variably filled by any person in the same way but also that two complementary roles can be filled by any set of two different agents or by one and the same agent. The three roles of “The Times They Are A-Changin’” can be cooperatively filled by three people playing together (say, by Peter, Paul, and Mary) or by one person filling all roles at the same time (say, by Dylan). Sauce hollandaise can be made by one person (pouring and whipping) or cooperatively by two people (one pouring and the other whipping). Understanding an action role in agent-neutral terms contrasts with an agent-centric, specifically egocentric conception of a role that does not allow for conceiving of the role like a variable that remains the same irrespective of who fills it. An agent with an egocentric conception of an action role can fill the role alone, but the agent cannot conceive of the role as a role equally fulfillable by someone else and, thus, fails to recognize the equivalence between his or her filling the role and someone else’s doing so.

¹ This is the class of so-called “cooperatively neutral” activities ([Bratman, 1992](#))—activities that can, but need not, be performed cooperatively; making a sauce hollandaise together, where one stirs and the other pours in the melted butter ([Searle, 1990](#)), is an example. “Cooperatively loaded” activities, in contrast, conceptually require interpersonal cooperation; dancing the tango together and kissing each other are examples.

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