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Giving and taking: Representational building blocks of active resource-transfer events in human infants

Denis Tatone [a,*], Alessandra Geraci [a,b], Gergely Csibra [a,c]

[a] Cognitive Development Center, Central European University, Budapest, Hungary
[b] Department of Cognitive Sciences, University of Trento, Italy
[c] Department of Psychological Sciences, Birkbeck, University of London, London, United Kingdom

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ABSTRACT

Active resource transfer is a pervasive and distinctive feature of human sociality. We hypothesized that humans possess an action schema of GIVING specific for representing social interactions based on material exchange, and specified the set of necessary assumptions about giving events that this action schema should be equipped with. We tested this proposal by investigating how 12-month-old infants interpret abstract resource-transfer events. Across eight looking-time studies using a violation-of-expectation paradigm we found that infants were able to distinguish between kinematically identical giving and taking actions. Despite the surface similarity between these two actions, only giving was represented as an object-mediated social interaction. While we found no evidence that infants expected the target of a giving or taking action to reciprocate, the present results suggest that infants interpret giving as an inherently social action, which they can possibly use to map social relations via observing resource-transfer episodes.

1. Introduction

Humans regularly transfer food and non-food items, both reactively (i.e., under solicitation) and proactively, with kin and non-kin alike (Gurven, 2004; Jaeggi, Burkart, & Van Schaik, 2010). Resource-transfer practices within and between households have been documented virtually for any known society. Moreover, the archeological record contains telling evidence of sharing networks dating back to the late Upper Paleolithic, as inferred by specific site structures and butchering patterns (Enloe, 2003). This is in stark contrast with the typical resource sharing behavior of non-human primates, where the most prevalent type of resource transfer is passive food sharing, generally consisting in one individual obtaining food from another without the possessor's active help (Brosnan & de Waal, 2002). Active food sharing, consisting in one individual voluntarily handing food to another, is on the other hand virtually absent in non-human primates (de Waal, 1989; Feistner & McGrew, 1989; Ueno & Matsuzawa, 2004), totaling a mere 1% in almost 10,000 observations of food transfer (in capuchins: Stevens & Hauser, 2005). The few documented instances of active resource transfer are mostly limited to captivity settings, either in token exchanges with human experimenters (Brosnan & de Waal, 2005; Hyatt & Hopkins, 1998) or under direct solicitation by physically impeded conspecifics (Celli, Tomonaga, Udono, Teramoto, & Nagano, 2006; Nissen & Crawford, 1936; Yamamoto, Humle, & Tanaka, 2009). An exception to this pattern is represented by Callitrichids, which proactively transfer high-quality food items in the wild. Tellingly, however, such provisioning behavior is mostly restricted to parental-care contexts (Brown, Almond, & Bergen, 2004; Jaeggi & van Schaik, 2011). Thus, despite the action of transferring

* Corresponding author at: Cognitive Development Center, Central European University, Nádor u. 9, Budapest 1051, Hungary.
E-mail address: denis.tatone@gmail.com (D. Tatone).

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a resource to another individual is part of the behavioral repertoire of a number of primate species, in none the frequency and breadth of giving-based interactions comes close to the ubiquity and variety of exchange practices documented across humans societies. This suggests that different motivational and cognitive systems, rather than mere action capabilities, should be invoked in accounting for such conspicuous divide (Delton & Sell, 2014; Tomasello, 2008).

1.1. Giving as an action schema

We hypothesize that humans are equipped with a specialized cognitive adaptation for understanding and participating in resource exchange. We characterize such dedicated system as an action schema: a system of domain-specific abstract knowledge whose function is to provide an internal structure for efficient event representation (Frankenhuis & Barrett, 2013; Goodman, 1980). The activation of this 'giving action schema,' like any other schema, depends on the processing of a specific set of high-validity cues (Barrett, 2005). The number of cues that the schema is sensitive to depends on the number of perceptually overlapping but functionally different action representations that could be simultaneously activated at a given time (Cosmides & Tooby, 1994). For example, the actions of transferring an object to a social partner vs. disposing it may have surface similarities, but afford functionally different inferences about the agent's goals. The sensitivity of the schema to these cues is therefore revelatory of the assumptions about the target event that the schema embeds. These assumptions typically concern the number and kind of entities participating in the action, as well as changes in action parameters and in other relational properties that are relevant to the event representation (Gentner, 1975; Langacker, 1987).

On an abstract level of description, GIVING[1] can be defined as an object-mediated interaction, in which an agent (the Giver) performs an action directed to the goal of transferring the possession of an object to another agent (the Givee) (cf. Gentner, 1975). A suitable representation of GIVING needs therefore to include three elements (Giver, Givee, and object) whose relations change over time due to the Giver's action, which suspends the 'possession relation' formed between Giver and object to establish a new one between object and Givee (Newman, 2005; Tomasello, 1992). 'Possession', as intended here, refers to an agent's dispositional ability to control the fate of the object in question to a greater extent than other potential agents could (cf. Kummer & Cords, 1991; Stake, 2004; Brosnan, 2011). As such, it is conceptually different from ownership, which could be defined as a socially and normatively stipulated form of object control able to survive to temporary changes of possession (Blake & Harris, 2011; Friedman, Neary, Defeyter, & Malcolm, 2011; Kalish & Anderson, 2011).

[1] To distinguish the concept of action schema from its instantiations, we will refer to the former in small caps (e.g., GIVING). This distinction allows us to remain agnostic as to whether and to which extent the actual representation of stimulus events that are intended to capture the essential features of an action schema instantiates its corresponding concept.

In linguistics, the verb 'give' is considered to be an obligatorily three-place predicate requiring distinct arguments for Giver, Givee, and transferred possession (Kittilä, 2006; Newman, 2005; Tuggy, 1998). This structural feature is seemingly a linguistic universal: in none of the known languages, in fact, 'give' features among the verbs that allow the recipient to be removed from the clause core (Kittilä, 2006). An intuitive way to appreciate why 'give' entails the existence of three distinct arguments is offered by the so-called "omissibility test", proposed by Newman (2005) as a diagnostic test for necessary argumenthood. Simply put, this test requires removing one of the entities from the semantic frame and evaluating its effects on the event representation: if an entity is an essential component of the frame, its removal should fatally compromise event representation. As it appears, a giving action would immediately cease to be an instance of GIVING once we remove either the object or the Givee from the corresponding event representation.

Recent findings from developmental psychology suggest that this and other assumptions about the verb 'give' may be derived from an early-developing conceptual representation of giving actions, which predates the understanding of the trivalent structure of 'give' clauses. Below we review some of the studies showing that preverbal infants may indeed apply these assumptions when confronted with giving actions.

1.2. Evidence from studies with infants

The first assumption of the definition we provided for GIVING is that the action is represented in a three-place event structure. There is ample evidence that young infants can represent the relation between two agents and encode their respective action roles for different action domains such as chasing (Rochat, Morgan, & Carpenter, 1997; Schlottmann, Surian, & Ray, 2009; Southgate & Csibra, 2009) or helping (Hamlin, Wynn, & Bloom, 2007; Kuhlmeier, Wynn, & Bloom, 2003). There is also evidence that infants spontaneously include objects in the event representation when they functionally contribute to the establishment of a social interaction. In a study by Gordon (2003), 10-month-olds habituated to a puppet hugging another one or giving her a toy showed a quick recovery of looking times when the giving (but not the hugging) action was repeated without the object, thus revealing that they expected the presence of an object only in the case of giving. Note that the selectivity of these expectations could only be explained by assuming that infants were able to extract information about the goal of the object-carrying agent from the dynamics of the action causing the object to contact the other agent. These results provide empirical support for the claim that the representation of giving actions includes not only the interacting agents but also the object transferred, and that such inclusion is not merely triggered by any kind of object manipulation in a dyadic context.

Evidence for infants establishing an action schema of GIVING also comes from studies on prosocial preferences. Hamlin and Wynn (2011) reported that 3- and 5-month-olds showed a robust preference for a puppet (Giver),