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Dialog as interpersonal synergy

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A B S T R A C T

What is the proper unit of analysis in the psycholinguistics of dialog? While classical approaches are largely based on models of individual linguistic processing, recent advances stress the social coordinative nature of dialog. In the influential interactive alignment model, dialogue is thus approached as the progressive entrainment of interlocutors' linguistic behaviors toward the alignment of situation models. Still, the driving mechanisms are attributed to individual cognition in the form of automatic structural priming. Challenging these ideas, we outline a dynamical framework for studying dialog based on the notion of *interpersonal synergy*. Crucial to this synergetic model is the emphasis on dialog as an emergent, self-organizing, interpersonal system capable of functional coordination. A consequence of this model is that linguistic processes cannot be reduced to the workings of individual cognitive systems but must be approached also at the interpersonal level. From the synergy model follows a number of new predictions: beyond simple synchrony, good dialog affords complementary dynamics, constrained by contextual sensitivity and functional specificity. We substantiate our arguments by reference to recent empirical studies supporting the idea of dialog as interpersonal synergy.

1. Dialogical coupling: from synchronies to synergies

Recent studies portray conversation as the progressive entrainment of linguistic behaviors of two or more individuals (Pickering & Garrod, 2004). In other words, interlocutors engaged in dialog spontaneously align their linguistic behaviors on multiple levels from prosody to syntax, thus increasing the coordination of attention, action and conceptualization (Fusaroli & Tylén, 2012). Building on and extending such models, we advance the idea of conversations as *interpersonal, functional synergy*: through context-sensitive alignment and complementary dynamics, interlocutors develop patterns of stable interactions[1] fit to the affordances and goals of the situation, whether good rapport, motor coordination, the solution of a problem, etc.

Inspired by dynamical systems theory, the model of *dialog as synergy* thus reconceptualizes reciprocal imitation as part of a complex process in which interactional patterns are jointly curbed and shaped by situational and task constraints. In order to articulate this conceptual framework, we i) introduce and discuss the model of dialog as alignment, with its theoretical assumptions and limitations, ii) build upon it to develop a more comprehensive model of *dialog as functional synergy*, and iii) introduce preliminary empirical evidence supporting the model as well as suggestions on how to further put it to test. Our examples are mostly taken from contexts of cooperative, task-oriented conversations. However, while the generality of the model is still open for future investigation, initial empirical results point to the applicability of the model to other genres of conversations, such as conflictual ones (Paxton & Dale, submitted for publication).

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[1] As later argued in the paper, 'stable' is intended in the technical sense as implying *dimensional compression* and *resistance to perturbation*, cf. § 3.

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2. From monologue to dialog: the model of synchronization

2.1. Beyond monologue: the model of interactive alignment

The vast majority of existing approaches to the psychology of language focus exclusively on the workings of individual minds and brains (Deacon, 1997; Gallese & Lakoff, 2005; Pinker, 1994). Classical cognitivist approaches such as Generative Grammar are explicitly committed to ideas about the innateness and modularity of language (Fodor, 1984; Hauser, Chomsky, & Fitch, 2002; Pinker, 1994). However, even more functional cognitive approaches (Fauconnier & Turner, 2003; Lakoff & Johnson, 1999; Talmy, 2000) seem implicitly biased toward written monologue as the model-language of study (Linell, 2005). Besides, both generative and cognitive linguistics, although in quite different ways, have favored strong representationalism: The understanding of linguistic behavior is first and foremost a matter of disentangling and mapping abstract cognitive linguistic representations, whether in terms of generative syntactical structure or embodied image schemas (Tylén, Fusaroli, Bundgaard, & Østergaard, 2013). However, studies focusing on the social and dialogical dynamics of language deeply challenge the individualist conceptions of the cognitive mechanisms underlying linguistic interaction and call for new models (Bickhard, 2007; Clark, 1996; Dale, Fusaroli, Duran, & Richardson, in press; Fusaroli, Demuru, & Borghi, 2012; Rączaszek-Leonardi & Kelso, 2008; Tylén, Weed, Wallentin, Roepstorff, & Frith, 2010).

With the recent introduction of dialogical models, such as the *interactive linguistic alignment in conversation* (Pickering & Garrod, 2004), psycholinguistics has made important advances beyond the classical cognitivist assumption that language is primarily a property of individual cognitive systems. The interactive linguistic alignment theory relates to a growing literature characterizing human interaction in terms of reciprocal behavioral and physiological mimicry (Chartrand & Bargh, 1999; Dijksterhuis & Bargh, 2001): Seeing somebody shaking a foot or rubbing the nose makes people unconsciously imitate them (Chartrand & Bargh, 1999), and laughter, smiles, eyebrow movements, headshakes and nods, are more likely to occur if one's interlocutor has just employed them (Louwerse, Dale, Bard, & Jeuniaux, 2012). Analogously, Pickering and Garrod approach dialog as imitation-like coordination of linguistic behaviors. Through an *automatic structural priming* mechanism (Pickering & Ferreira, 2008), interlocutors reciprocally align linguistic behaviors and representations on multiple levels. If one interlocutor speaks in a high tone of voice, the other will start speaking with a higher tone too and if she is calling a car "speedster", the other will have a higher probability of also using the word "speedster" in response. Additionally, structural priming implies that alignment at any given level – say lexical – contaminates and spreads to other levels – say prosodic, syntactic and conceptual. Indeed, the ultimate goal is the alignment of cognitive processes and, in particular, higher-level situation models. This, in turn, enables a deep mutual understanding and thus facilitates fine coordination on collective tasks (Pickering & Garrod, 2004).

2.2. Alignment as synchronization

Focusing on the way participants imitate and simulate each other toward greater alignment of their linguistic behavior (and ultimately conceptual models), the theory of linguistic alignment implicitly rests upon a widespread physical model: *synchronization*. In systems composed of multiple interacting elements, synchronization is defined as a process in which two independent components continuously influence each other toward greater entrainment within a certain lag tolerance (Pikovsky, Rosenblum, & Kurths, 2001). This influence works as a reciprocal imposition of attraction and constraints that allows the synchronizing parties to reduce the overall variance of their joint activity, making them more similar, more regular. Or put more simply, to synchronize means that two entities through mutual influence come to do more or less the same thing within temporal proximity.[2] A prime example of synchronization – as well as the historical origin of the model (Strogatz, 2003) – is the progressive coordination of two swinging pendula. When two pendulum clocks hang side-by-side, they gradually come to swing in synchrony. This happens because subtle vibrations from the clocks pass through the wall, perturbing their individual rhythms until they gradually reach a state of entrainment (Saltzman, 1995). In this case, the entrainment is mediated through purely mechanical means. However, similar phenomena can be observed in biological systems. Numerous observations have been made of people spontaneously synchronizing handheld swinging pendula (Schmidt, Richardson, Arsenault, & Galantucci, 2007), their heart rates (Konvalinka et al., 2011), or the frequencies of their rocking chairs even when these have different weights and momentums (Richardson, Marsh, Isenhower, Goodman, & Schmidt, 2007). Furthermore, as mentioned, interacting human beings have been observed to make their facial expressions, and gestures more and more similar over time (Dijksterhuis & Bargh, 2001). Such observations have their linguistic analog in the *principle of structural priming* as the underlying mechanism in dialog. In short, structural priming implies that linguistic units presented by one interlocutor are more or less unconsciously and automatically picked up and repeated by the other interlocutor at a short temporal distance (more or less the same thing at more or less the same time). The mechanisms involved are, of course, different from pendulatory oscillations, but the end result is analogous: similar linguistic behavior happening approximately at the same time.

2.3. Limits to the model of mechanistic synchronization

The simplicity of this model and its low-level automaticity are intriguing and, indeed, several aspects of linguistic synchronization are found in corpus studies and

[2] It has to be noted that entrainment and synchronization might entail more complex phenomena than this, where rhythmic cycles are coordinated beyond local proximity and across multiple time scales (cf. Fusaroli, Abney, Bahrami, Kello, & Tylén, submitted for publication). However, we argue, a simplified notion of synchronization underlies the notion of alignment.