tional participant, a structural alignment process like the one posited to be involved in analogical reasoning and similarity can be used to help synchronize representations (Gentner 1983; Gentner & Markman 1997). The structural alignment process takes pairs of relational representations and places them in correspondence. Structural alignment requires that the relations and objects that are matched be seen as identical (or can be decomposed into structures that are partially identical). Thus, this process provides a method for creating semantic parallels between people's situation models and their representations of conversational partners' situation models.

One advantage of thinking about the alignment of situation models as a structural alignment process is that there are several established empirical benchmarks that are hallmarks of analogical reasoning (Markman & Gentner 2000). It is possible to test for the presence of these benchmarks in discourse-level processing. For example, there is substantial interest in discourse on the role of inferences in comprehension (e.g., Graesser et al. 2001; McKoon & Ratcliff 1992). The structural alignment process suggests that inferences are made on the basis of systematicity. Specifically, a piece of information is inferred when there is a correspondence between two representations and there is information in one representation that is connected to the correspondence that can be carried over to the second representation (Clement & Gentner 1991; Markman 1997). Other information is not carried over as an inference. Thus, this view makes a testable prediction about what kinds of information are likely to be inferred by conversational participants. Similarly, experiments could be devised to explore the other published benchmarks.

It is not clear that the structural alignment process should be involved at other linguistic levels. If people do not maintain separate representations for themselves and their partners for grammatical and phonetic processing, then some other process must be involved in synchronizing these representations across individuals. The authors suggest one way this could occur. If the same representations are used for both production and comprehension at the level of grammar and phonology, then these representations will be synchronized by virtue of the nature of the language process. Representations at these levels would be influenced by factors such as priming (as suggested in the target article).

This analysis suggests that factors such as systematicity that should affect the formation of situation models should not have an influence on phonetic and grammatical processing. It would be interesting to carry out studies to explore whether systematicity and other benchmark phenomena of structural alignment affect other levels of linguistic processing. If they did, this would suggest that people are maintaining separate representations of their own processing and that of their partners at a variety of linguistic levels.

Beyond linguistic alignment

Allan Mazur

Center for Environmental Policy and Administration, Maxwell School, Syracuse University, Syracuse, NY 13244. **amazur@syr.edu**

Abstract: Dialogue requires ability beyond the production and comprehension of word strings. The interactive alignment account is good as far as it goes, but it must be embedded in a broader model encompassing alignment of paralinguistic representations.

Dialogue is not only the natural arena for language; it requires abilities that are different from the production and comprehension of sentences and phrases. Children with the variant of autism known as Asperger's Syndrome have good sentence skills but cannot carry on a normal conversation because they have difficulty with eye-to-eye gaze, facial expression, and body gestures that regulate the exchange.

Pickering & Garrod's (P&G's) ingenious account of interactive alignment illustrates gains that can be had in broadening the study of language from monologue to dialogue. I urge upon the authors a further expansion, embedding spoken dialogue within a broader model of human (and ape) turn-taking communication.

Conversations allow interlocutors to share meaning conveyed by body postures, facial cues, and intonation – apart from the particular strings of words that are used. Sometimes the words spoken are irrelevant to the primary representation that is to be aligned. A conversation between two knowledgeable people, ostensibly about Chaucer, may be more importantly a dominance contest, or a seduction, or bonding chatter between friends – though words manifestly about these meanings may never be exchanged.

We often recognize the relationship between conversing foreigners and the general intent of their communication, even though we may not understand their language.

As long as actors can see one another, they can communicate with remarkable efficiency even when distance or a barrier precludes speech. I recall standing with a handsome male colleague on a busy street corner. He whispered aside to me that he was visually flirting with a woman seated on a bus some distance away; he predicted (correctly) that as the bus drove off, she would turn toward him with a broad smile.

Paralinguistic signaling is especially effective in aligning social relationships within a dyad. This enables Ego and Alter to agree on who is the leader and who the follower; to communicate affiliation, affection, or hostility; and to sympathize emotionally. Consider, as an example, how dialogue can establish the relative status of interlocutors, independently of the words that are used.

Spoken or nonverbal "dialogue" is governed by mutually understood rules (Mazur 1985). Some rules are asymmetrical, specifying different actions for a high-status actor and for a low-status one. Two asymmetrical rules are:

1. *The high-status person sets the pace and mood of the conversation, and the low-status person follows.* Pace and mood may be set with smiles, jokes, frowns, exclamations, and volume, rapidity, or intonation of speech. If Ego tells a loud joke, Alter can deferentially comply with a loud laugh or can challenge by substituting an inappropriate response.

2. *The high-status person introduces and terminates major topics of conversation.* This rule, like the previous one, indicates that the high-status person can take control of the conversation, which is the essence of having high status. If both interlocutors attempt to set the conversational agenda, there is a dominance contest. Other rules are symmetrical, applying without regard for the status of the actor. It is the *violation* of symmetrical rules that signals a dominant act, whereas strict conformity to them signals deference or politeness. Important symmetrical rules are:

3. *If one individual is speaking, the other should remain quiet.* If Ego interrupts Alter's speech, Ego has acted dominantly.

4. *A listener who is offered the floor should speak.* A speaker can pass the floor by asking a question of the listener, or by directing his eyes to the listener after concluding a speech. If Ego remains silent after Alter offers the floor, Ego has acted dominantly.

5. *Do not look into another individual's eyes when no one is speaking* (unless in a romantic context). The violation of this rule, silent staring, is a common dominant act among primates, whereas rule-following eye aversion indicates deference.

6. *Look at the speaker's face, especially if the speaker is looking at you.* To look away, suggesting inattention, is hard to do if you respect the person speaking to you. If the speaker is of minor consequence, it is easy to violate the rule, thus showing your dominance. (This rule is inoperative when averted eyes overtly signal submission, as in looking down while being scolded.)

7. *Do not speak loudly, sternly, or angrily.* Shouting matches and arguments are obviously dominance contests.

8. *The speaker should direct the listener's actions by request rather than command, and should avoid a stern or stubborn tone.* To speak in a commanding or inflexible way implies that the listener is of lower status.

https://doi.org/10.1017/S0140525X04380052 Published online by Cambridge University Press

These rules operate within a context of linguistic interaction. The words spoken may or may not be an important part of the whole display. When we deferentially compliment someone, we speak in strict accordance with the rules, whereas our verbal insults gain emphasis when violating the rules of dialogue. We accompany our speech with appropriate gestures, perhaps glaring for dominance or smiling for deference. This full array of actions – words, gestures, and rules – constitutes the status display.

A natural model of conversation must go beyond the interactive alignment of word strings. P&G have briskly stepped onto the road of dialogue. I hope they soon take another step forward.

Correspondences between the interactive alignment account and Skinner's in *Verbal Behavior*

Joseph J. Pear

Department of Psychology, University of Manitoba, Winnipeg, Manitoba R3T 2N2, Canada. **pear@cc.umanitoba.ca**
http://www.umanitoba.ca/cgi-bin/psychology/hpg_main.cgi?data/pear.txt

Abstract: Pickering & Garrod's (P&G's) interactive alignment account corresponds directly with the account Skinner (1957) gave in his book *Verbal Behavior*. This correspondence becomes evident when "properties of verbal stimuli" substitutes for "channels of alignment." Skinner's account appears to have the dual advantages of requiring fewer basic terms and integrating the field of verbal behavior with the whole field of human behavior.

There are strong correspondences between Pickering & Garrod's (P&G's) interactive alignment (IA) account and Skinner's (1957) verbal behavior (VB) account. Similar to P&G's assumption that dialogue is the basic form of language processing, Skinner took the interaction between speaker and listener as fundamental (see Skinner 1957, Figures 1–6, pp. 38, 39, 57, 84, 85). I explain further correspondences with reference to Table 1 below, which is based on Table 2 in the target article.

Regarding row 1, the situation models in the IA account correspond in the VB account with variables controlling each interlocutor's behavior, some of which may be private (Skinner 1957, pp. 130–46; also see Skinner 1953, Ch. 17). The alignment channels in the IA account correspond with properties of verbal stimuli. Because of reinforcement of many different instances of echoic behavior, which is the direct imitation of the properties of verbal stimuli, echoic behavior generalizes widely (Skinner 1957, pp. 55–56), just as the tendency to align generalizes across alignment channels in the IA account.

Regarding row 2, sustained dialogue occurs only if the interlocutors have implicit common ground in the IA account or emit similar verbal behavior in the VB account. In the VB account, effective verbal interaction occurs between the extremes of identical and completely dissimilar verbal behavior (Skinner 1957, pp. 271–72). In the IA account, there is a repair mechanism for preventing dialogue from breaking down or for restoring it if it does. In the VB account there are several reinforced response-strengthening techniques that maintain dialogue, such as prompts and probes (Skinner 1957, Ch. 10, pp. 253–92; see also p. 58 for examples of clarification and expansion requests involving echoic behavior).

What in the IA account is called full common ground – a complex model shared by both interlocutors – is not common in ordinary dialogue according to either account. Both accounts maintain that constructing and using these models are derived (e.g., learned) abilities or behaviors.

Both accounts also agree that we obtain a distorted view of grammar by looking at it only in monologue. In the VB account, grammar is the expression of responses called autoclitics that modify the effect on the listener of responses that Skinner (1957, p. 312) called "the raw material out of which sustained verbal behavior is manufactured." When listeners cannot frequently or immediately prompt or probe the speaker's verbal behavior, there is

Table 1 (Pear). *Correspondences between the interactive alignment account of language processing in dialogue and the verbal behavior account*

Interactive alignment account (IA)	Verbal behavior account (VB)
1. *Linkage between interlocutors* Links across multiple levels of representation via "alignment channels." Sound comes to encode words, linguistic information, and aspects of situational models.	1. *Linkage between interlocutors* Control across multiple properties of verbal stimuli. Sound comes to bring the listener's behavior under the control of variables controlling the speaker's behavior.
2. *Inference* Externalized in the interaction between interlocutors via a basic interactive repair mechanism.	2. *Inference* Externalized in the interaction between interlocutors via reinforced techniques of strengthening verbal behavior.
3. *Routines* Arise out of the application of the interactive alignment in specific situations. A high proportion of dialogue contains these units, which facilitate both production and comprehension.	3. *Routines* Functional verbal units that are conditioned or strengthened process. A high proportion of dialogue uses routines, which simplify both production and comprehension.
4. *Self-monitoring* Monitoring occurs at any level of representation that is subject to alignment as a consequence of the account.	4. *Self-monitoring* Occurs for all aspects of verbal behavior because speakers typically are also listeners.
5. *Repair mechanisms* The same basic repair mechanism for self-repair and other-repair.	5. *Repair mechanisms* The same basic principles apply for strengthening one's own verbal behavior and strengthening that of others in specific situations.
6. *Linguistic representations* Needed to deal with linked utterances in dialogue, including nonsentential "fragment."	6. *Linguistic representations* Not needed because the contextual stimuli suffice to produce linkages in dialogue.

https://doi.org/10.1017/S0140525X04380052 Published online by Cambridge University Press