Pragmatic Choice in Conversation

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Abstract

How do people decide what to say in context? Many theories of pragmatics assume that people have specialized knowledge that drives them to utter certain words in different situations. But these theories are mostly unable to explain both the regularity and variability in people's speech behaviors. Our purpose in this article is to advance a view of pragmatics based on complexity theory, which specifically explains the pragmatic choices speakers make in conversations. The concept of self-organized criticality sheds light on how a history of utterances and subtle details of a situation surrounding a conversation may directly specify language behavior. Under this view, pragmatic choice in discourse does not reflect the output of any dedicated pragmatic module but arises from a complex coordination or coupling between speakers and their varying communicative tasks.

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1. Pragmatic choice in conversation

What speakers say in conversation depends on many factors, including people's assumptions about the context and their communicative task. The study of linguistic pragmatics has been specifically devoted to how people use and understand language in context, with many scholars seeking to explain speakers' particular choice of words in dialogs. Many pragmatic theories assume that pragmatics is its own proprietary set of knowledge skills guiding context-sensitive language use, somewhat akin to other substantial bodies of linguistic competences, such as phonology, morphology, syntax, and semantics. Our purpose in this article is to advance a view of pragmatics based on the principles of complexity theory, which specifically explains the pragmatic choices speakers make in conversations. The concept of

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self-organized criticality sheds light on how a history of utterances and subtle details of a situation surrounding a conversation may directly specify language behavior. Under this view, pragmatic choice in discourse does not reflect the output of any dedicated pragmatic module but arises from a complex coordination or coupling between speakers and their varying communicative tasks.

2. Deciding what to say

Much research on language production maintains that speech begins within the general cognitive system where thoughts and intentions originate, which then gets transformed through a series of separable components in words, syntax, and finally speakers' utterances (Garrett, 2000; Levelt, 1989). People are sometimes aware of their thoughts and intentions, and even what words and syntax to use, as they strategically plan what to say in specific social circumstances (Lee & Pinker, 2010). But for the most part, language production is seen ''as an almost paradigmatic example of a modular system . . . in which processes at one level (e.g., syntactic encoding) are encapsulated from the processes occurring at other levels (e.g., phonological encoding)'' (Vigliocco & Hartsuiker, 2002, p. 442). Even at the level of pragmatics, where speakers must decide what words are most appropriate given the context, it is widely argued that different types of pragmatic knowledge are fully modular (Sperber & Wilson, 2002). Thus, what gets spoken is causally driven by distinct modular mechanisms responsible for different pragmatic actions (Sperber, 2005), a version of the belief in ''massive modularity'' as the fundamental architecture of mind.

Some psycholinguistic proposals argue against classical modular views of language production, especially given empirical evidence showing significant bidirectional flow of information during speech planning processes (see Postma, 2000; Vigliocco & Hartsuiker, 2002 for reviews). Nonmodular models of language production typically focus on how people create single sentences in different experimental tasks in which limited sources of linguistic and nonlinguistic knowledge interactively constrain what is said. But there has not been significant attention to the broader purpose of speaking in discourse, where the organism as a whole, with a unique history and understanding of its particular adaptive needs, is properly acknowledged. Let us explore how this can be accomplished taking as our guide the idea of self-organized criticality.

We begin by considering two different situations in which speakers must chose the right words to say. Imagine first that you are in the following situation. You are walking across a university campus one afternoon when a stranger approaches and asks, ''Excuse me, do you have the time?'' You look at your digital watch and see that the time is 1:57 p.m. One way of responding to the speaker's implied request for the time is simply to read off what the digital watch indicates such that you would reply, ''It's 1:57 p.m.'' or perhaps ''It is 3 minutes till 2.'' Answering in this manner may be easiest from your point of view, and it provides the addressee detailed information about the time that may be useful. Indeed, traditional pragmatic theories assume that people should seek to be truthful in their speech actions, through adherence to a maxim of quality (Grice, 1989). Yet research shows that

digital watch wearers in this identical situation do not typically reply with the exact time but round off their answers by saying something like ''It's 2 p.m.'' or ''It's about 2'' (Gibbs & Bryant, 2008).

The rough, approximate answer is surprising because it would seem to increase your difficulty in replying, precisely because you have to first read the exact time and then round off to get to the ''It's 2 p.m.'' response. But studies actually reveal that digital watch wearers require less time to offer rounded replies to time questions than to give exact replies, even though their watches indicate an exact time. So, in this situation, seeing an exact time and reporting it appears to complicate the process of answering the time question ''Do you know the time?'' It is as although the exact response is not entirely appropriate or optimal for addressees in this situation. In a different situation, however, where a person approaches and says, ''Excuse me, my watch has stopped. Do you have the time?'' digital watch wearers quickly reply with exact answers, precisely because they now see exact time information as being most relevant to the addressee's present concerns, such as wanting to precisely reset a watch (Gibbs & Bryant, 2008).

Consider now a different situation of pragmatic choice. Imagine that you are at a laundry mat when you discover that you need change for a five-dollar bill to do your wash. You decide to approach a stranger also doing her laundry to see if she may be able to help you. What is the most appropriate way to make this request? You could just ask directly, by saying, ''Give me change for this five-dollar bill,'' but such a direct statement may be rude and so you chose to make an indirect request. Indirect requests specify one part of a sequence of events that constitute a transaction of goods between speakers and listeners. There are many linguistic forms in which indirect requests can be made in English.

For example, requesting that an addressee change a five-dollar bill can be accomplished in several ways. Among these are questioning the ability of the listener to perform the desired action (''Can you give me change for five dollars?''), questioning the listener's willingness to perform this action (''Will you give me change for five dollars?''), questioning whether the act of giving you change poses an imposition for the listener (''Would you mind giving me change for five dollars?''), simply stating one's desires for the listener to give you change for five dollars (''I want you to give me change for five dollars''), making a statement about some relevant fact about the world (''I can't do my wash without change for this five dollar bill''), or finally, asking what the listener thinks about giving you change (''How about changing this five-dollar bill for me?''). Each instance is an indirect speech act that may serve to get change to do your wash in the right situation.

Many pragmatic theories assume that the choice of which linguistic form to use when making an indirect request is primarily a matter of arbitrary convention. Some ways of making indirect requests (''Can you tell me the time?'') have historically developed as being most appropriate, and even polite, across a variety of contexts. Thus, there are no particular experiential motivations for why speakers prefer some request forms over others in different situations (Morgan, 1975; Searle, 1975). But a close look at the social pragmatics of indirect requests reveals a different story. Making requests of others typically interrupts what the other is doing, and so speakers must find a way of inserting their request into the conversation in such a way as to alleviate the bother to the listener and

thereby maximize the likelihood of the listener fulfilling the request. In particular, each speaker appears to formulate his or her request in a specific way to anticipate the listener's greatest potential obstacle in complying with the request (Francik & Clark, 1985; Gibbs, 1986).

For example, participants in one naturalistic study were brought to different locations on a university campus, each of which was carefully designed to highlight a different potential obstacle (Gibbs, 1986). In one case, an experimenter and a participant went inside the university library and walked over to a table where a student was busily working on a paper assignment. The participant was told to imagine sitting near the student while also working on a paper when his or her pen suddenly ran out of ink. Participants were then asked to state what they would say to the nearby student in order to get that addressee to lend them a pen. Overall, participants produced obstacle-appropriate requests 74% of the time. Thus, when the obstacle appeared to be the addressee's ability to lend a pen speakers said, ''Can you lend me a pen?'' and when the obstacle focused on whether the addressee had possession of the desired goods, speakers stated, ''Do you have a pen I can borrow?'' and so on.

In general, when people are asked to make the requests in situations, which closely approximated the real world, they have a strong tendency to produce utterances that anticipate the presumed obstacle present for the addressee. These findings replicate other laboratory studies in which participants read about different scenarios designed to highlight different obstacles for addressees, and they wrote down what they, the participants, would likely have said in those contexts (Gibbs, 1986). The anticipated obstacle hypothesis, therefore, provides a good explanation for people's pragmatic choices in different contexts where a speaker makes a request of an addressee.

The two sets of studies on answering time questions and making indirect requests demonstrate how people appear to adhere to certain pragmatic principles when choosing what to say in context. When replying to time questions, people adhere to a principle of optimal relevance. They design their utterances to anticipate enabling a listener to draw a maximum number of cognitive effects while minimizing the listener's effort in having to infer those effects. When producing indirect requests, people adhere to a principle of anticipating potential obstacles that may stand in the way of addressees in fulfilling these implied requests. Much cross-disciplinary work in pragmatics aims to discover these kinds of broad and specific principles that guide people in their choice of what to say, and in how they interpret what others intend to communicate.

3. Variation in what was said

But there are several good reasons to question whether people's choices of what to say in speaking are primarily determined by actual pragmatic principles. First, not all people followed the preferred pragmatic principle examined in each of the above studies. In both the study on answering time questions and the study on making indirect requests, more than 25% of participants produced utterances that were inconsistent with the preferred principle being considered. Second, even people who generally made choices consistent with the pre-

ferred principle sometimes produced utterances that did not match the principle. Thus, a significant proportion of people's choices for what to say seemed ''unprincipled.'' What are the origins of the uncertainties that these choices demonstrate?

What should we make of the discrepant findings? Do some speakers simply not possess sufficient pragmatic knowledge to produce optimally relevant utterances in context? People are often sensitive to the demands of context and alter their behaviors accordingly to meet their own and others' adaptive needs. Are they more or less sensitive, however? There are now thousands of published studies in the cognitive sciences demonstrating how adding a more or less constraining context changes human performance. For the most part, the data obtained from these studies have been interpreted as indicating the presence or absence of certain top-down constraints on the operation of some stage or component within, in this case, the linguistic information processing system. For instance, having additional information that a person's watch has stopped, and that the person may want to reset it with exact time information, could facilitate processing a speaker's ''Do you have the time?'' request to recognize that an exact reply in most desirable.

Yet we suggest that altering the context does not simply change the amount of information a person has that in turn affects his or her subsequent behavior by degree. Instead, changing the context creates a new task for the person, for example, from one of trying to give a rounded time answer to one of giving an exact time response. The difficulty with traditional pragmatic accounts is that they do not fully appreciate such qualitative changes in task-performance outcomes, and too often they locate their explanation within some fixed feature of the cognitive system (e.g., feedback from top-down contextual information onto processing of semantic and pragmatic meaning). Our argument is that the performance of pragmatic speech is an emergent property of self-organizing performance subject to the configuration of task constraints that compose a rounded-time-answering language system. Thus, the words that people may choose to say in different contexts arise within the dynamics of self-organization constrained by the very particular task demands that define a context. Self-organization may imply the absence of external control (autonomy), multiple equilibria (many possible attractors), hierarchies (multiple nested self-organized levels), dynamic operation (temporay nature of processes), global order (emergence from local interactions), and top-down causality (global order constrain local dynamics; Bak, 1996).

For instance, another source of variation in pragmatic speech is that people sometimes fail to recognize their shared ''common ground'' with listeners in at least some situations. Speakers design each utterance so that their addressees can figure out what they mean by considering the utterance against their current common ground (Clark, 1996). Some common ground information is cultural (i.e., information broadly shared by members of a community) and some information is personal (i.e., information uniquely shared by two or more speakers). Consider, for example, an experiment in which two persons talk to each other but cannot see each other. Both sit before schematic drawings of cartoon figures, new to both parties. One conversant describes a specific figure from her set of figures, and the other identifies the correct picture from his set using the heard description alone (Clark, 1996). Unsurprisingly, participants get better at this task over time. Speakers initially provide detailed

descriptions of the figures to make initial identifications possible, but over time each pair of dialog partners eventually evolves a shared idiosyncratic lingo specific to the given task environment, allowing them to pick out figures more quickly. Thus, on a first trial, one speaker referred to a figure by saying, ''All right, the next one looks like a person who is ice skating, except that they're sticking two arms out in front.'' But on the sixth trial in this study, the same speaker simply said, ''The ice skater.''

Many psycholinguistic studies have demonstrated, similarly to this, how people build up different common ground information that provides important constraints on speakers' pragmatic choices (Clark, 1996; Gibbs, 1999). Speakers try to design each utterance so that their addressees can figure out what they mean by considering the utterance against their current common ground. Yet to some degree, the varied results of the answering time questions and making indirect request studies are consistent with the idea that people may not always accurately access what is mutually shared with addressees. For example, when answering a question such as ''My watch has stopped. Do you have the time?'' a responder may incorrectly assume that the speaker only required a general sense of the time (e.g., ''It is close to 2''), and not an exact time in order to accurately reset the stopped watch (e.g., ''It is 1:57''). In this case, the responder spoke given his assessment of the common ground but was simply wrong about this and did not respond adequately to the request.

Multiple studies have provided empirical evidence that speakers are sometimes more egocentric in their productions than predicted by the traditional common ground view, and that listeners do not regularly or consistently consider common ground in their comprehension (Barr & Keysar, 2005). For example, speakers often use referential terms that are rooted in their own knowledge rather than knowledge contained in their common ground with a listener. Thus, a speaker might ask for the ''Phillips screwdriver,'' when only one screwdriver is uniquely defined by the interlocutors' common ground, and a listener might think this must mean some other screwdriver or ask for clarification (Barr & Keysar, 2005). Speakers will also use abbreviated referential terms developed with a different person, when the current addressee is actually someone else who has no knowledge of those abbreviations (Barr & Keysar, 2002). Indeed, people seem generally poor at knowing what others know and at judging the effectiveness of their own communication. Speakers who have learned the meaning of opaque phrases, for instance, will overestimate the likelihood that other people know those meanings (Keysar & Bly, 1995). Speakers also think their own utterances are less ambiguous and more effective than they actually are (Keysar & Henly, 2002).

In general, despite studies showing how speakers mostly adhere to common ground information in discourse, some recent evidence questions the necessity of common ground for ordinary language production and comprehension. Instead, as suggested by Keysar and colleagues' different findings, the initial stages of speech production and understanding are inherently egocentric, particular in moments when speakers experience cognitive stress in some manner. Common ground information is typically used at a later, corrective stage of production and understanding.

4. Explaining regularity and variation

How do we reconcile these two different views on the necessity of common ground in pragmatic theories of speaking and understanding? Do speakers' pragmatic choices become more oriented toward their own knowledge and less toward what they share, and know that they share with listeners? One difficulty here has to do with the kinds of experimental tasks employed to investigate speakers' pragmatic choices. Studies favoring the common ground position tend to ask people to participate in cooperative communication tasks where there is a premium on saying things most efficiently. Studies favoring the egocentric view employ tasks where speaker and listeners must collaborate but under more complex situations where one is easily misled to believe that certain contextually relevant information is shared, when in fact it is not. Not surprisingly, more perspective-taking errors arise in the latter case, which may appear to indicate more egocentric thinking on speakers' parts, even if they still may be attempting to formulate their utterances in ways that meet the needs of their current common ground with listeners.

To some extent, part of the debate in psycholinguistics over the significance of common ground centers around which empirical task best reflects people's ordinary communicative abilities. But a different way of looking at this debate suggests that no single task captures the complex underlying psychological reality when speakers and listeners talk with one another (Kloos & Van Orden, 2009; Van Orden & Kloos, 2005). Indeed, any instance of speech communication fundamentally constitutes a different task for the participants given their idiosyncratic histories, dispositions, and situation. It is this flexible capacity that we wish to capture in the concept of self-organization. Each different configuration of task demands as task constraints engenders a differently self-organized mind and body. The flexible capacity to self-organize to suit task constraints exists because mind and body compose a complex system. Specifically, the embodiment of task demands constrains the mind and body to anticipate task-appropriate utterances in critical states.

More generally, we do not believe that experimental psycholinguistic studies looking at the buildup and possible use of common ground information in speech reflect the output of a single pragmatic processes or module. People's pragmatic choices in speaking derive from perpetually iterated dynamical processes, whereby multiple simultaneous conflicting constraints self-organize people's in-the-moment potentials for utterances and meaningful experiences. Indeed, the coordinations between speakers and listeners—ranging from postural and gestural coordination (Shockley, Richardson, & Dale, 2009) to coordination of brain dynamics (Stephens, Silbert, & Hasson, 2010)—that are seen in speech communication are themselves aspects of an emergent coordinative structure encompassing the participants in the conversation in their entirety.

In our view, the bases of any particular utterance or the reasons for people's interpretations of language are contingencies, which are to an underappreciated extent the products of idiosyncrasy in history, disposition, and situation. Yet contingencies have a long history of being manipulated in psycholinguistics, and it should be possible to build a bridge between this literature and complexity science (Hollis, Kloos, & Van Orden, 2009). As a part of that bridge, a control parameter is a generalization of familiar independent variables. For

instance, a priming manipulation situates performance to a target stimulus, contingent on the presence, absence, or the qualities of the relation between prime and target. A control parameter is not the same thing as and should not be equated with independent variables, as factors are no longer conceived as being independent in their interaction. For example, the context provided by a target word to its prime is conceived as being as essential to the priming manipulation and effect as the context that the prime provides for the target. In this way, prime and target are conceived as interdependent in their interaction and in their combined interaction with other relevant factors of the laboratory context. Control parameters are related independent variables in being a synthesis of the factors that would traditionally have been individuated as independent factors (Wallot & Van Orden, in press).

The concept of interdependence in self-organized criticality sheds light on how a history of utterances and the subtle details of a situation surrounding a conversation may directly anticipate language behavior. Self-organized critical states entail plausible but unexpected propensities to act just prior to enacted speech. A critical state entails all the propensities to speak that satisfy constraints due to relevant history and present context. Relevant historical constraints include the relevant anatomical and physiological constraints that allow us to move and speak in some ways and not others, the details of the speakers' previous history, including a speaker's native tongue and unique history of well-being and idiosyncratic relations with other living beings, as well as what has been said previously in the exchange. If a person's history includes a well-known penchant for speaking very politely, then his or her previous use of indirect request utterances may constrain the present self-organization of speech such that ''I wonder if it would be at all possible for you to lend me a pen?'' is more likely to be stated than some other indirect request utterance. All the available sources of constraint, in the moment before saying any word or making any verbal sound, contribute constraints to self-organize the anticipatory critical state. Subsequently, any relevant contingency favoring one propensity for speech over all others, no matter how seemingly inconsequential it may be otherwise, will collapse the critical state and enact speech consistent with the favored propensity, to become observable measured behavior (Kloos & Van Orden, 2010; Riley & Turvey, 2002; Zbilut, 2004). The term *relevance* in this sense thus implies only that a contingency sufficiently pertains to the informational content of the critical state so that it can discriminate between anticipated speech outcomes.

Fundamentally, each laboratory phenomenon of linguistic behavior also entails coupling in time, between task and participant, self-organizing mind and body in interaction-dominant dynamics (Kello, Anderson, Holden, & Van Orden, 2008). As the multiple processes of mind and body change, cycle, or oscillate through time, they must altogether find a coupling to satisfy the laboratory environment of task constraints. The coming together is called *frustration* because each process expresses simultaneously its tendency to fluctuate independently and to bring every other process into entrainment (Van Orden, 2010). Consequently, the coordination that emerges is highly flexible, even as it is enacted, because no competing process has fully given up its influence. Fully determined or fully random coordination are both frustrated by the dual tendencies of independence and dominance, insuring that each spoken utterance is a singular event. Embodied criticality poises a person—body and mind—as a singular anticipatory organization to act as a coherent being.

The importance of timing in self-organization is also evident in people's use of various bits and pieces of speech that do not necessarily contribute to the meaningful content of what is said but are produced to constrain listeners' interpretation of the ongoing flow of discourse, to insure appropriate coupling in time. Consider one example of procedural speech in the context of a brief encounter between two strangers on a university campus (Gibbs & Bryant, 2008):

Mary: ''Excuse me, do you have the time?''

John (who is wearing an analog watch): ''uh, it's like five . . . ten after four.''

Mary: ''Thanks.''

John includes procedural cues, such as ''uh'' and ''like,'' to both signal that Mary should continue processing what he is saying and that his response reflects a rounded, and not exact, answer about the time. Respondents' introduction of dysfluencies (e.g., ''uh'' and pauses) and words (e.g., ''like'' in ''it's like five''), which seem to matter little to the particular semantic content of their messages (e.g., the time is about 4:10 p.m.), vary depending on their presumptions of what is optimally relevant in a specific context, and what should take the temporally prominent position. Gibbs and Bryant (2008) showed that people employ a range of procedural cues when answering questions about the time in different contexts, including whether they were wearing analog or digital watches (Gibbs & Bryant, 2008). People employed more procedural cues (e.g., ''well,'' ''about,'' and ''like,'' in addition to filled pauses like ''um'' and ''uh'') when providing rounded answers than exact ones. They did so mostly unconsciously, not merely because of production problems, but to reduce listeners' processing effort by slowing the discourse and limiting the range of potential hypotheses generated online about the speaker's intended meaning, that the time provided may only be approximate, or rounded, as opposed to exact.

People's use of procedural cues in answering time questions is just one of many areas of discourse where speakers employ linguistic and paralinguistic markers of both conceptual and procedural meaning. Speech dysfluencies like ''um'' and ''ah'' or silence, far from being evidence of communicative deficiency on the part of the speaker, actually constitute a systematic means of synchronizing the actions of speakers with those of their interlocuters, and they are precisely designed to help others analyze and understand what the speaker is saying. Dysfluencies are not problems but solutions to issues of timing, coordination, and emphasis.

It is hard to imagine what specific pragmatic module could be responsible for speakers' idiosyncratic use of procedural speech. We still face the challenge of explaining how procedural cues unfold exactly as they do in discourse. Speech acts are anticipated in critical states but they are enacted by the immediately relevant contingencies. At the moment before enacted speech, all emphasis is on the constraints that circumscribe alternatives for speech. At the moment of enacted speech-relevant contingencies distinguish among the poised alternatives, which supply a sufficient cause enacting the chosen alternative.

This theoretically prominent role for contingencies highlights an important dilemma for current scientific accounts of speech, and all other, behavior. Most generally, scientists lack empirical access to the proximal causes of enacted behavior. We cannot know sufficient contingent details to predict with certainty the proximal causes of saying, ''Do you have the time?'' as opposed to ''Can you tell me the time?'' no matter how well we know the speaker and situation. Psycholinguists can design experiments, as described above, that shape the context of the time telling or request utterance to create a bias in favor of speakers saying certain phrases, or employing some procedural cues, but the priming would affect a priori constraints, exclusively, not the proximal articulation of one set of words as opposed to another. This is why the most elegant designs and precise experimental controls still yield variation as unsystematic deviations from their planned outcomes.

Instability of critical states plus unpredictable contingencies also explain why speakers often utter words that are not necessarily consistent with one another, which sometimes leads people to say things that appear to be incoherent. Consider, for example, a narrative by an adult man who has suffered traumatic brain injury (Perkins, 2008, p. 16):

> I have got faults, and. my biggest fault is. I do enjoy sports. It's something that I have always done. I've done it my whole life. I've nothing but respect for my mother and father and. my sister. and basically sir. I've come to this conclusion this last two months. and as far as I'm concerned. my sister doesn't exist.

This person suffers from a pragmatic impairment related to his discourse being incoherent (Perkins, 2008). Neuropsychologists have offered long lists of such deficits and typically assume that each behavioral disorder has its roots in some underlying part of the pragmatic module. Modularity is driven by a particular strategy of method in which scholars posit particular types of discrete entities and then search for dissociations of behavior attributed to these (or vice versa) as evidence for their existence. Dysfluent speech has been a prominent target for such investigations.

Even dysfluent speech, however, is a complicated, finely executed, motor performance involving about 70 muscles that are coordinated with relatively high speed and accuracy (Abbs & Connor, 1989; Turvey, 2007). Factors such as movement amplitude and rate affect the stability of the coordination during speech production (as they do in the coordination in limb control; Kelso, 1995). For example, a speaker with apraxia of speech and Broca's aphasia, which are often thought to be related forms of pragmatic impairment (Perkins, 2008), showed apparent compensation in the coordination between tongue and lips, quantified in continuous estimates of relative phase and its variability. Although the speaker often produced dysfluent speech, greater upper-lip movement amplitudes increased the stability of intra-gestural and inter-gestural coordination resulting in fluent speech (Van Lieshout, Bose, Square, & Steele, 2007).

On our view, all pragmatic impairments should be seen first as compensatory adaptations. All communicative impairments have a pragmatic dimension in that they seem somewhat out of balance, not meaningless so much as convoluted in meaning, as although

the critical states of options to be enacted were insufficiently constrained by the near term history of the discourse. But this is just as well a reconfiguration of choice, possibly due to an amplification of the frustration that underdetermines all utterances before the fact. To a degree, it does not matter where in the body the original insult occurs, or exactly how it is compensated for because, in the end, the expressed utterance is a product of contingency, now including the contingencies associated with the insult. The deficit may affect constraints we would call linguistic, cognitive, or motor and compensation may be attempted by making adjustments to similar or quite different sources of constraints. Because of this, there is no single causal link between an underlying deficit and a resulting compensated utterance, contrary to what is assumed by modular modules of speech production and pragmatic impairment (Perkins, 2008). Rather, the latter may express the impairment only indirectly as it is a consequence of contingent compensations and contingencies of enaction.

Ordinary speakers often make pragmatic choices that can also be judged as incoherent, despite having no obvious clinical impairment. Consider the following example, first appearing in *The Times* (October 12, 1998) and later reprinted in *The New Yorker* magazine as an item in its long-running filler titled ''Block that Metaphor!'':

As I look at it with broad brush, there are a lot of things going South at the same time, said Morris Goldstein, a former International Monetary Fund official and senior fellow at the Institute for International Economics in Washington. ''Where's the good news coming from? There's no silver bullet out there!''

What connects diverse metaphorical, idiomatic phrases such as ''As I look at it with broad brush,'' ''a lot of things going South at the same time,'' and ''There's no silver bullet out there!''? Rather than assuming some even temporary confusion in the speaker's mind over what to say, we can better characterize the use of mixed metaphors as the product of competing idiosyncrasies or contingencies of available constraints upon self-organization. Self-organization supplies the set of propensities for enacted speech, which can include competing metaphors. Indeterminate relevant contingencies break the symmetry of the poised options, which in the presence of mixed metaphors may enact a series of mixed metaphors. On a different day, the same speaker's propensities might have been more strongly constrained by his immediate history of speaking, thus maintaining a coherent set of utterances throughout. In the right situations, we can all appear mostly fluent; in less optimal circumstances we can all sound incoherent.

5. Self-organized, pragmatic criticality

Pragmatics is not the exclusive property of language or cognition, nor is it related to a specific system of semiotics, nor to a particular medium such as the vocal-auditory channel or the gestural–visual channel. Pragmatics is related more inclusively to communication and can be seen to reflect five broad assertions (adapted from Perkins, 2008).

First, pragmatics involves the range of options open to us when we communicate and the choice among the options. The availability of option A rather than option B will be an emergent consequence of constraints present in the intrapersonal and interpersonal domains. An individual, a pair of individuals, or a group of individuals, may each be seen as a lucid communicating system, a SUPER-organism of sorts, where the perpetual unfolding of globally organized behavior determines and is determined by the interactions among its components.

Most generally, self-organized intentions and other sources supply constraints to stay near critical states and contingencies collapse critical states into speech (Kloos & Van Orden, 2010; Van Orden, 2010; Van Orden, Kloos, & Wallot, in press). The choice of an enacted option is not necessarily conscious or dictated by some central executive system. In this picture, language performance expresses temporary dynamical structures as constraints, emergent coordination as critical states, and the creation of information in language use. Critical states thus form the bridge from intentions to overt communication.

Second, pragmatic choices are involved at all ''levels'' of language activity, from discourse to word use to phonetics to vocal kinematics, and more broadly from culture to neurophysiology.

Third, every spoken word enacts the resolution of an indefinite number of potential choices, which include various linguistic, cognitive, and bodily propensities. The essence of pragmatics lies in the ways different constraints interact, becoming interdependent in interaction-dominant dynamics. For instance, propensities to speak are partly shaped by syntactic complexity, which is constrained by short-term memory limitations, and also by the amount of attention allocated to sentence production at any one time.

Fourth, the choices available to pragmatics are motivated by the requirements of interpersonal communication. To the extent that the body's actions are not motivated by the requirements of interpersonal communication, it may not be seen as pragmatics. Showing someone the face of your watch so that he or she can see the time is a pragmatic choice. Waving a watch in front of someone's face to chase away an annoying fly is not.

Finally, there is no direct link between behaviors and underlying deficits or resulting pragmatic impairments. We cannot assume that particular linguistic behaviors, and deficits, are caused by single internal mechanisms, as always assumed by modular theories of language performance. Rather, the latter are always the consequences of one or more compensatory adaptations within a chain of contingencies that include the insult to the body. Although it may be tempting to describe a conversational impairment in terms of say, syntax, the implied causal status goes too far beyond the data on which to base the inference (e.g., Van Orden, Pennington, & Stone, 2001).

Any resemblance to syntax may be the tip of an iceberg constituted by complex chains of strongly nonlinear interactions, with dynamic adaptations within the interactions. These situated interactions and adaptations, rather than the processes involved in the interactions, are the essence of pragmatics. Pragmatic impairment may be defined as a change in the stability of interactions within the intrapersonal domain caused by an insult to the body as the medium that supports interactions. The insult itself may indirectly constrain or restrict an otherwise wider range of potentialities, or it may indirectly fail to constrain sufficiently a range

of potentialities. Consequent dysfunctions may be compensated for, with varying degrees of success, by exploiting the considerable scope of trade-offs among the remaining available constraints within one or more domain.

The changes proposed here in theory and method, then, are not about the empirical factors that can be manipulated or observed (however, see Van Orden et al., in press). The changes we have focused on are about what can be concluded from a successful manipulation or observation. Each examined factor is expressed empirically in an interaction among all other available factors of mind, body, history, context, and communicative task. It no longer appears credible to pick out selected factors as special or elite representatives of cognitive or linguistic structure, to be favored or highlighted above others. No factor has yet accrued the kind of evidence that would justify such conjecture and perhaps no factor ever will, though the future is uncertain as always. What is certain, today, however is this: No known factor stands alone to produce human performance. Communicative performance, like all human performances, is the product of interaction-dominant dynamics, which anticipates the future in pragmatic choices for speaking or listening with understanding.

References

Abbs, J. H., & Connor, N. P. (1989). Motor coordination for functional human behavior: Perspectives from a speech motor data base. In S. Wallace (Ed.), *Perspectives on the coordination of movement* (pp. 157–183). Amsterdam: North-Holland.

Bak, P. (1996). *How nature works: The science of self-organized criticality*. New York: Copernicus.

Barr, D., & Keysar, B. (2002). Anchoring comprehension in linguistic precedents. *Journal of Memory and Language*, *46*, 391–418.

Barr, D. J., & Keysar, B. (2005). Mindreading in an exotic case: The normal adult human. In B. F. Malle & S. D. Hodges (Eds.), *Other minds: How humans bridge the divide between self and other* (pp. 271–283). New York: Guilford.

Clark, H. (1996). *Using language*. New York: Cambridge University Press.

Francik, E., & Clark, H. (1985). How to make requests that overcome obstacles to compliance. *Journal of Memory and Language*, *24*, 360–368.

Garrett, M. F. (2000). Remarks on the architecture of language processing systems. In Y., Grodzinsky, L., Shapiro & D., Swinney (Eds.), *Language and the brain* (pp. 31–69). San Diego, CA: Academic Press.

Gibbs, R. (1986). Why are some indirect speech acts are conventional? *Journal of Memory and Language*, *25*, 182–196.

Gibbs, R. (1999). *Intentions in the experience of meaning*. New York: Cambridge University Press.

Gibbs, R., & Bryant, G. (2008). Striving for optimal relevance in answering questions. *Cognition*, *106*, 345–369.

Grice, H. P. (1989). *Studies in the ways of words*. Cambridge, MA: Harvard University Press.

Hollis, J., Kloos, H., & Van Orden, G. (2009). Origins of order in cognitive activity. In S. Guastello, M. Koopmans, & D. Pincus (Eds.), *Chaos and complexity: Recent advances and future directions in the theory of nonlinear dynamical systems* (pp. 206–241). Cambridge, England: Cambridge University Press.

Kello, C. T., Anderson, G. G., Holden, J. G., & Van Orden, G. (2008). The pervasiveness of 1/f scaling in speech reflects the metastable basis of cognition. *Cognitive Science*, *32*, 1217–1231.

Kelso, J. A. S. (1995). *Dynamic patterns: The self-organization of brain and behavior*. Cambridge, MA: MIT Press.

Keysar, B., & Bly, B. (1995). Intuitions of the transparency of idioms: Can one keep a secret by spilling the beans? *Journal of Memory and Language*, *34*, 89–109.

Keysar, B., & Henly, A. (2002). Speakers' overestimate of their effectiveness. *Psychological Science*, *13*, 207–212.

Kloos, H., & Van Orden, G. (2009). Soft-assembled mechanisms for the unified theory. In J. P. Spencer, M. Thomas, & J. McClelland (Eds.), *Toward a unified theory of development: Connectionism and dynamic systems theory re-considered* (pp. 253–267). New York: Oxford University Press.

Kloos, H., & Van Orden, G. (2010). Voluntary performance of cognitive and motor tasks. *Mind & Matter*, *8*, 19–44.

Lee, J. J., & Pinker, S. (2010). Rationales for indirect speech: The theory of the strategic speaker. *Psychological Review*, *117*, 785–807.

Levelt, W. J. M. (1989). Speaking. Cambridge, MA: MIT Press.

Morgan, J. (1975). Two types of convention in indirect speech acts. In P. Cole & J. Morgan (Eds.), *Syntax and semantics: Vol. 3. Speech acts* (pp. 45–61). New York: Academic Press.

Perkins, M. (2008). *Pragmatic impairment*. New York: Cambridge University Press.

Postma, A. (2000). Detection of errors during speech production: A review of speech monitoring models. *Cognition*, *77*, 97–131.

Riley, M. A., & Turvey, M. T. (2002). Variability and determinism in motor behavior. *Journal of Motor Behavior*, *34*, 99–125.

Searle, J. (1975). Indirect speech acts. In P. Cole & J. Morgan (Eds.), *Syntax and semantics: Vol. 3. Speech acts* (pp. 59–82). New York: Academic Press.

Shockley, K., Richardson, D. C., & Dale, R. (2009). Conversation and coordinative structures. *Topics in Cognitive Science*, *1*, 305–319.

Sperber, D. (2005). Modularity and relevance: How can a massively modular mind be flexible and context-sensitive. In P. Carruthers, S. Laurence, & S. Stich (Eds.), *The innate mind: Structure and content* (pp. 53–68). Oxford, England: Oxford University Press.

Sperber, D., & Wilson, D. (2002). Pragmatics, modularity and mindreading. *Mind & Language*, *17*, 3–23.

Stephens, G. J., Silbert, L. J., & Hasson, U. (2010). Speaker–listener neural coupling underlies successful communication. *Proceedings of the National Academy of Sciences, USA*, *107*, 14425–14430.

Turvey, M. T. (2007). Action and perception at the level of synergies. *Human Movement Science*, *26*, 657–697.

Van Lieshout, P. H. H. M., Bose, A., Square, P. A., & Steele, C. M. (2007). Speech motor control in fluent and dysfluent speech production of an individual with apraxia of speech and Broca's aphasia. *Clinical Linguistics & Phonetics*, *21*, 159–188.

Van Orden, G. (2010). Voluntary performance. *Medicina*.

Van Orden, G., & Kloos, H. (2005). The question of phonology and reading. In M. J. Snowling & C. Hulme (Eds.), *The science of reading: A handbook* (pp. 61–78). Oxford, England: Blackwell Publishing.

Van Orden, G., Kloos, H., & Wallot, S. (in press). Living in the pink: Intentionality, wellbeing, and complexity. In C. A. Hooker (Ed.), *Philosophy of complex systems. Handbook of the Philosophy of Science*. Amsterdam: Elsevier.

Van Orden, G., Pennington, B. F., & Stone, G. O. (2001). What do double dissociations prove? *Cognitive Science*, *25*, 111–172.

Vigliocco, G., & Hartsuiker, R.J. (2002). The interplay of meaning, sound & syntax in language production. *Psychological Bulletin*, *128*, 442–472.

Wallot, S., & Van Orden, G. (in press). Grounding language performance in the anticipatory dynamics of the body. *Ecological Psychology*.

Zbilut, J. P. (2004). *Unstable singularities and randomness: Their importance in the complexity of physical, biological and social sciences*. Amsterdam: Elsevier Science.