Making good psychology out of blending theory

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Abstract

From a psychological perspective, blending theory is attractive because of its goal of accounting for a wide variety of linguistic and conceptual phenomena, its explicit attention to meaning construction (not just meaning processing), its analysis of construction processes from a dynamical perspective, and its recognition of the "emergent" properties of meaning and cognition. I describe several principles that scholars should consider when thinking of blending theory in a psychological framework. These include acknowledging the importance of falsification, alternative hypotheses, the processes and products of meaning construction, and different levels of mental representation.

Keywords: meaning construction; falsification; alternative hypotheses; processes and products of understanding; levels of mental representation.

The seeds for my admiration of conceptual integration, or blending, theory were sown over 15 years ago during my early years as a university professor. A student in my psychology of language class presented me with an example of an extended metaphor that seemed to defy theoretical description. The metaphor was found in a brief narrative from the oceanic column of the New Yorker magazine, titled "Block That Metaphor!"

From the International Film Guide, 1984.

"Jimmy artist, Lester Bates, become the lodestar for young clowns groping..."

My purpose in this brief article is to explore some of the issues related to making good psychology out of blending theory. Both cognitive linguists and psychologists raise questions about the empirical support for blending theory and I offer some suggestions for how best to think about blending theory as a psychological model of language and thought processes.

The importance of falsification

Psychologists, like most scientists, favor hypotheses that lead to specific experimental predictions. Perhaps the most central feature of any theory with psychological consequences is that it must, in principle, be falsifiable (Popper 1959). Is blending theory capable of being, in principle, falsified? Many psychologists complain about cognitive linguistics work that trying to infer aspects of conceptual knowledge from an analysis of systematic patterns of linguistic structure leads to theories that appear to have a post hoc quality. Thus, positing that blended spaces underlie many systematic patterns of linguistic expressions is seen as providing only a motley explanation for linguistic behavior. Cognitive psychologists and psycholinguists, on the other hand, wish to be able to predict behavior in advance according to the hypothetico-deductive method of scientific inference. What they seek is empirical, objective evidence (i.e., not based on a theorist's private intuitions) that people's conceptual knowledge somehow predicts the existence of different linguistic behavior, not that people's linguistic behavior can be explained post hoc by posing theoretical entities such as blending spaces (or any other notion from cognitive linguistics such as conceptual metaphor, image schemas, and so on).

What counts as falsifying a particular hypothesis requires some statement in advance as to the very conditions under which the hypothesis should even be evaluated. To some degree, these very conditions are the subject of debate in cognitive linguistics (cf. Croft 1999; Sanders and Roe 1995). But it is important to realize that blending theory is not a single theory that can be studied and potentially falsified within a single experimental test. Instead, blending theory is a broad framework that suggests a variety of localized hypotheses, each of which may be experimentally examined under different empirical conditions. Theories with the greatest interdisciplinary appeal, and most likely to be seen as reasonable candidates as psychological theories, will be those with specific

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quality and Sri Lankan film audiences lost some of their taste for such unhealthy food" (New Yorker).

What's remarkable about this short passage is that most readers acknowledge some understanding of what the author may have meant, despite the twisted mix of metaphors. For instance, readers seemed to construct some mental model for the idea of someone being the one-eyed man in a country of the blind and interpret the metaphorical implications of this statement. Moreover, the idea of better cinema opening up fresh ground that drained the Indian filmic culture of its nutrient quality, while Sri Lankan film fans lost some of their taste for such unhealthy food, all makes sense to most readers, even if many people find it difficult to verbally articulate the meanings they intuitively comprehend.

When my students discussed this example, it was evident that no psychological model of metaphor could come close to capturing what people may do to comprehend the metaphors in this narrative. Fortunately, much has happened since the mid-1980s that provides psychologists with great hope for explaining these complex linguistic examples. Fauconnier's (1984) early work on mental spaces, and various articles that extended this perspective (Fauconnier and Sweetser 1996), have eventually led to the provocative proposals on blending theory (Coulson 2000; Fauconnier 1997; Fauconnier and Sweetser 1996; Fauconnier and Turner 1998; Edery et al., 1999). Blending theory attempts to analyze the dynamic nature of mappings in thought and language. According to this approach, mental spaces are conceptual structures that people construct as they think and use language. Fauconnier and Turner (1998) described general cognitive processes, dubbed as "blending", which operate on these mental spaces as inputs. These input spaces project on to separate blended spaces, which inherit partial structure from each of the possible multiple input spaces, but also yield new emergent meaning structures.

From a psychological perspective, blending theory has several attractive features. First, the theory has the promise of accounting for a wide variety of linguistic and conceptual phenomena. Second, blending theory pays explicit attention to meaning construction, not just meaning processing (or meaning "selection"), especially in its focus on multiple space, rather than two-space, integration processes. Third, blending theory looks at these construction processes from a dynamical perspective. Finally, blending theory places important emphasis on the "emergent" properties of blending, meaning and cognition. For example, blending theory may capture aspects of on-line meaning construction for the understanding of many kinds of verbal metaphors. Under this view, metaphorical interpretations of novel combinations of figures, such as that seen in the "Block That Metaphor" column, are reconstructed on the fly, emerging from blended spaces and not from the input spaces alone, nor from some additive space of what two or more domains have in common (i.e., the generic space).
hypotheses which give rise to empirical predictions that can in principle be falsified. One promising place to start thinking about empirically examining the claims of blending theory is with the optimality principles, suggested by Fauconnier and Turner (1998), which act as constraints on possible blending operations. The challenge for blending theory is to find ways in which different parts of the theory can be articulated so that these hypotheses can in principle be subject to tests of falsification.

Consider alternative hypotheses

A second, related challenge for making good psychology out of blending theory is to contrast the various predictions of the theory against different alternative ideas. For instance, blending theorists sometimes suggest that more complex cross-domain mappings are required to understand certain meaning constructions as compared to others. One possible empirical claim following this idea is that people may need additional cognitive effort, and thus more processing time, to understand linguistic expressions that reflect more complex cross-domain mappings than those that reflect less integrated constructions (see Coulson 2000, for some thoughts on this idea). Although this empirical hypothesis, and the corresponding empirical prediction, may be correct, many alternative theories of linguistic understanding may predict the same pattern of findings. Thus, people may indeed take longer to understand a complex blend, such as John is digging his own grave, than it takes them to comprehend an equivalent literal utterance (e.g., John is hurting himself by his actions). Yet this result may be due to other variables like the frequency of the individual words involved (i.e., faster reading of the literal phrases because their words are more frequent, and easier to access from the mental lexicon), or the role that transitional probabilities at the word level have in speeding up reading of some phrases over others. Different theories may even suggest that digging his own grave is highly conventionalized and thus doesn’t require that listeners derive from scratch complex blends premised on whether this phrase means.

In general, the empirical data from an experiment can be consistent with the claims of blending theory, but other accounts may be equally able to explain the same data. The best way to deal with this important step in the logic of making inferences about the data from experiments is to ensure that reasonable alternatives are always explicitly formalized and empirically examined. These remarks in no way diminish the significant contributions blending theory has already made toward our understanding of meaning construction processes. Blending theory, for instance, is far more comprehensive in the scope of meaning constructions it can explain, and has indeed shown that it is a more satisfactory account than several alternative theories for different linguistic phenomena (e.g., counterfactuals).

Distinguish the process and products of meaning construction

A major problem with interdisciplinary theories of language understanding is that many researchers fail to distinguish between how language is processed and the meanings that are produced once language has been understood (Gibbs 1994). Consider again the statement of digging his own grave. Each of us can read this statement and reflect upon several of its possible metaphorical interpretations. When talking about how we interpret this figurative statement, we mostly consciously ponder the products, or the results of, various cognitive processes that we very quickly, mostly unconsciously, pass through as we comprehend this expression. But the processes of linguistic understanding are different from the products that we consciously think about when we read or hear verbal expressions.

Scholars in different disciplines too often mistakenly try to infer something about language processes from an examination of language products and vice versa. “Linguistic understanding” is not a single activity, but is a process that occurs in real-time along a variety of temporal dimensions, starting in the first milliseconds of unconscious processing. But a theory of linguistic processes (e.g., how we produce and comprehend metaphors) is quite different from theory of what meanings we consciously infer once some piece of language has been understood.

Blending theory posits rather complex mental processes that seem necessary for people to interpret rich semantic meanings. Thus, understanding the expression John is digging his own grave involves the complex blending of several input spaces to project the right kinds of nuanced figurative meanings for this expression. In this way, then, complex meaning predicats arise from complex meaning construction processes. My question is whether drawing inferences about meaning construction from an examination of meaning products is necessarily accurate as a psychological processual view of linguistic comprehension. Do people ordinarily infer the complex meanings presumably associated with the phrase John is digging his own grave, as suggested by Fauconnier and Turner (1998)? Must people actually create complex blended spaces to understand what speakers intend by this expression? Do listeners create new blended spaces each and every time they hear an expression? When do the various mappings occur during meaning construction? How do specific blending operations—such as combination, completion, and elaboration—figure

in the on-line creation of different meanings for linguistic expressions? Suggestions for answering these questions within blending theory will go a long way toward making this framework more amenable to psychological test and theorizing (see Coulson 2000 for some ideas about this issue).

Questions of mental representations

Cognitive psychologists always debate the best way to characterize the representation of knowledge. Blending theory offers some provocative ideas about how people represent information and map different domains of knowledge to create blended mental spaces. I have previously urged that cognitive linguists, and others, should be conservative in both interpreting empirical data as evidence on mental representations, and in positing complex mental machinery that may not always be necessary to capture even complex facets of thought and language (Gibbs 1999; Gibbs and Matslock 1999). One way of evaluating the psychological status of blending theory is to consider its relation to several proposals on mental representations suggested by Markman (1999). These proposals are as follows:

1. Cognitive models must be based on representations that actually represent.
2. Cognitive models must adopt multiple approaches to representation.
3. Cognitive models must use representations at multiple grain sizes.
4. Cognitive models must be clear about the specification of processes.
5. Cognitive models must attend to the details of processing as well as to its gross form.
6. Cognitive models must attend to social context.
7. Cognitive models must attend to the relationship between the individual and the world.

The first proposal suggests that cognitive models must be based on representations that actually represent. All too often, psychological models are simplified to deal with the data from laboratory tasks and it is unclear whether these models can scale up to real-world domains. The well-known symbol grounding problem, for example, demands that a representational model actually represent worlds (including the human body). Blending theory fares quite well in this respect, primarily because of its ability to deal with a wide range of real-world linguistic and cognitive phenomena, and because it explicitly attends to how mental representations are grounded in the real world of human experience.

The second proposal addresses that the fact that cognitive science, as of yet, has not provided a single representational scheme as the one true form of mental representation. Certainly, several unified theories of cognition have been proposed (e.g., Anderson and Lebiere 1998; Kintsch 1988; Newell 1990), and one challenge for blending theory is to assess its own success relative to these other theories for different aspects of language, memory, and thought (i.e., as part of the consideration of alternative hypotheses). Yet many cognitive scientists now contend that the complexity of human behavior requires that different kinds of representations be used to handle the diversity of cognitive experience. Thus, people’s varied abilities, from perception and motor control to language and problem-solving, may not all rest on the same representational base (e.g., featural representations, structured representational models, mental images, schematic representations). Although it is unclear whether blending theory needs to address perception and motor-control per se, it must acknowledge that different kinds of representation may suit various aspects of cognitive behavior. In general, further elaboration of the representational status of blending theory in terms of its ability to diverse cognitive experiences would be most welcome.

Proposal three focuses on the amount of information that is incorporated in each representational element (e.g., a mental space). Some representational elements can be coarse grained, while others are fine grained. For example, one connectionist account of analogical reasoning subserves multiple grain sizes under a single model (Hummel and Holyoak 1997). In this model, both distributed vector representations and local representations of concepts work in conjunction to respond to the specific contexts, as well as abstract from the fine details of situations when appropriate. Incorporating different grain sizes in this way is quite useful when modeling analogical reasoning, and possibly other cognitive domains. Blending theory appears, in principle, to be flexible enough to deal with different density of representations within any mental space. Yet whether different domains or fine-grained nature of any domain affects blending processes is unclear.

Specifying the processes that operate over representations is the challenge of the fourth proposal. The processing assumptions associated with any representational model determine whether the representa
tion can be applied to only one context or can be used flexibly across a variety of circumstances. Several psychologists have argued, for example, that some representations that seem highly inflexible (e.g., structured relational representations) can exhibit quite a bit of flexibility when
accompanying the right kind of processes (e.g., an analogical comparison process) (see Markman 1998). Blending theory, again, fares reasonably well in this regard, even if the challenge remains as to how to specify the time-course of various on-line mapping processes (i.e., what mappings get created when).

The fifth proposal aims to explain the fine details of both individual and group behavior. Most cognitive psychologists assume that individual variability is less critical than is average behavior across people. Their belief is that central cognitive processes underlie what people in general do, as opposed to idiosyncratic variation across people that may be attributed to "strategic" influences. Yet the data from experiments that are seen as "noise" can be meaningful within another set of representational assumptions, especially when one is trying to model the fine details of human performance (Telenz and Markman 1994). Many cognitive psychologists, to take one example, aim to tease apart aspects of behavior which reflect different underlying cognitive processes from those that only reflect differences in knowledge. I see this attention to both gross, or average, and individual behavior as a good challenge for blending theory as it seeks to explain the processes and products of individuals making constructions.

Proposal six emphasizes the importance of the social world in cognitive models. To give just one example, the social context, in which communication occurs provides an important way to standardize concepts across individuals (Feyn 1983), one reason why people's concepts overlap substantially. Meanings in conversational interactions are determined dynamically and mediated by discourse and representational states that are analyzed by speakers and listeners. At the same time, our interactions with others suggest that new representations are constructed collaboratively, a process in which people provide cognitive scaffolding for each idea to learn new concepts. Traditional cognitive models primarily focus only on the individual, and consequently, are too complex because they assume that learning of new concepts occurs individually while people often learn in collaborative social environments. Blending theory may also be guilty of this particular sin it focuses mostly on the cognitive processes within an individual acting alone when dealing with some linguistic variation or cognitive phenomena. I do not doubt, however, that blending theory aims to deal with cognition in social interactions, perhaps even in terms of distributed representations. In fact, blending theory, with its explicit emphasis on modeling emergent cognitive behavior, may be especially capable of demonstrating how different people can blend their knowledge together to jointly solve problems, understand language, make decisions, and so on.

The final proposal for cognitive models concerns the relationship between the individual and the world. Similar to the previous proposal, the idea here is that adopting a "situated action" perspective on cognition assumes that people need not have a complete representation of the world around them, in part because the world itself can act as an external representation (Clancey 1987; Hutchins 1998). This strategy provides a general model for some cognitive, and maybe, linguistic processes (see Gibbs 1999 for how this perspective can be applied to metaphor). In general, all aspects of complex cognitive processes need not be explicit enduring representations that take place in a complex environment. People have bodies and live in physical cultural environments, and cognitive models must acknowledge this fact. Blending theory seems, in some respects, over-deterministic in the way it posits complex mapping operations which presumably exist as part of people's ordinary conceptual behavior.

This cursory discussion of different representational issues provides additional guidelines for thinking about blending theory as a psychological model. Of course, few contemporary psychological theories meet all the challenges raised by the above proposals. My hope is that blending scholars will take these proposals seriously as they articulate the significance of their work as a potential psychological theory of thought and language.

How psychology can contribute to blending theory

Blending scholars do not have to actually conduct empirical research to gain the attention and respect of psychologists. An important way to get psychologists to pay greater attention at the advantages of blending theory is to describe how how psychological and psychological work fits within the framework, and more specific hypotheses, of blending theory. There are several areas of research in cognitive psychology and cognitive neuroscience that provide evidence directly relevant to the principles of blending theory. Clearly, the empirical work on analogy, metaphor, metonymy, and idioms is relevant, as acknowledged by Fauconnier and Turner (1998), as is the research on problem solving and logical inference (see Holyoak and Thagard 1995, Markman, 1998). Interest in how different cognitive processes are integrated also ties in nicely with many of the debates and empirical findings in psychology on conceptual combinations (see Thagard 1997). Concerns with understanding how constrained possible conceptual mappings also relates to psychological work on spreading activation and on-line knowledge activation and inhibition (or suppression), such as in models of spreading activation (within cognitive psychology, see Anderson et al.).