LANGUAGE COMPREHENSION, EMOTION, AND SOCIALITY

Aren't we missing something?

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28.1. THE "PSYCHO" THAT IS MISSING IN PSYCHOLINGUISTICS

SOME time ago, I was asked to contribute a discourse processing chapter to a 56-chapter 1000-page handbook on the human language faculty. The book explores, in breadth, how language is instantiated in humans. Large sections are about language architecture, processing, and neural realization. There is attention to development and prelinguistic communication, as well as to evolution, genetics, and animal models. There are chapters on iconic communication and home sign systems, on the language-ready organization of motor cortex, on primate vocalization, even various chapters on robots. Yet, a chapter on the relation between language and emotion—the topic that I initially explored—was considered beyond the scope of the book.

This raised an interesting question: Why not talk about emotion in that massive volume on how language is instantiated in humans? Is emotion irrelevant to language, and to its processing? Research in *other* domains of human cognition, such as perception, attention, memory, reasoning, and decision-making, has shown that emotion matters quite a lot there (e.g., Damasio, 1994; Gigerenzer, 2007; Greene, 2014; Haidt, 2012; Kahneman, 2011; Pessoa, 2015; Phelps, Lempert, & Sokol-Hessner, 2014). Wouldn't it be reasonable to assume this holds for language processing too? Furthermore, apart from being just another domain of human cognition, language also happens to be one of the pillars of human sociality, a sociality that is deeply affective. Just like other mammals, we care about such things as dominance, family, and sex. Furthermore, our species is equipped with a vast suite of moral emotions designed to steer us toward within-group cooperation and intergroup distancing (Greene, 2014). Language is a primary channel for expressing these various ingredients of our social life. The

power of words is around us everywhere, allowing us to persuade others to do what is good for them (or us), to tell others how much we care about things (e.g., how much we align with them and dislike others, or vice versa), to help or console others, and to share perspectives on the Human Condition. Simple words can cheer us up or put us down, make us angry or empathic, arouse our interest, or make us tune out instead. We use words to influence other people every day, in politics and passion, business and education, art and science, work and play. We even use words to motivate and otherwise influence ourselves.

So here is the puzzle: if language use is about affecting other people, about sharing emotions and evaluations, and about shaping collaboration and conflict, and if much of what people think and do is controlled by emotion anyway, why do we know so little about the interface between language and emotion? Empirical research on language and emotion *has* been growing, over the past decade or so (see, e.g., Majid, 2012). But the impact it is having on the field is relatively marginal, as if that work—although interesting and fun—does not really matter to the core endeavor of psycholinguistics. Why is that? Also, although recent theories explore how language shapes emotion via such things as verbal categorization, construction, and (re)appraisal (Koelsch et al., 2015; Lindquist, Gendron, & Satpute, 2016), the focus there firmly lies on emotion science, with language providing interesting constraints and insights. No theory to date addresses how emotion interfaces with language processing as the latter unfolds, such that we understand why words can yield the power that they do.

Should we worry about this? In this chapter I will argue that we should. Instead of reviewing the empirical research conducted on language and emotion so far (see, e.g., Besnier, 1990; Bohn-Gettler & Rapp, 2014; Lindquist & Gendron, 2013; Majid, 2012, for such reviews), I will make a more general case for why this research is important for psycholinguistics, and present a theoretical framework that should help us think about the interfaces between language and emotion. First, in section 28.2, I lay out some historical reasons for the dominance of a cognitive, non-affective perspective on the human language faculty. Next, for psycholinguists unfamiliar with research on emotion, section 28.3 contains a short primer on the subject. Then, in section 28.4, I present a model for affective language comprehension, explicit enough to at least help us think about the interaction between language and emotion in comprehension. As will be seen in section 28.5, the model can also help clarify the fuzzy concept of "word valence." Finally, section 28.6 contains some conclusions.

28.2 Why emotion is not really on the map

28.2.1 Historical factors

If we examine the history of psycholinguistics, it is not difficult to point to developments in the field that have inhibited the emergence of an affective perspective on language processing (see also Jensen, 2014).

(1) *Technological systems focus.* Just like other disciplines within, or overlapping with, cognitive psychology, psycholinguistics has been heavily shaped by the technology-driven perspective in that larger field. Using the digital computer as a major source of inspiration, cognitive psychology framed the human mind as a symbol-driven

information processing system, whose specialty was to compute accurate representations of the world, and store the invariant aspects of them in long-term memory for better future computation (e.g., Anderson, 1980; Newell & Simon, 1972). Digital computing and the theory behind it (e.g., Turing, 1950) brought in highly useful core ideas about symbols, about internal, mental representations of the outside world and rules operating over them, about static and dynamic memory, and about how to capture processing in flowcharts and computational models. Associated research on communication technology (e.g., Shannon & Weaver, 1949) brought in ideas about limited channels, noise, and bits of information being coded, transmitted, and decoded again. In psycholinguistics, this large cluster of technology-inspired ideas has led to questions about such things as how comprehenders decode noisy acoustic signals, store and retrieve lexical representations, recover syntactic structure, derive a proposition, compute reference, update the situation model, and code their own ideas for subsequent transmission, all questions about retrieving, manipulating, and storing information. As might be expected from an approach inspired by technological systems, it did not readily lead psycholinguists to ask questions about emotions, evaluations, and moods, or the needs of real living organisms that give rise to these affective phenomena.

(2) *Code-cracking focus.* Psycholinguists have always enjoyed the luxury of being able to work from whatever linguists had discovered about nature of language. In terms of a system levels analysis (Chomsky, 1965; Marr, 1982), the arrangement seemed perfect: thanks to quite articulate "competence theories" or "computational theories," psycholinguists to a large extent knew what phenomena to account for, and what distinctions would need to be made, for example, somehow, during actual processing—they simply needed to work out how it was done by the brain. But with that luxury also came subject matter biases that operated in linguistics itself. Mainstream linguistics in the 1970s–1990s focused on language as a generative coding system, and abstracted away from actual usage. The idea that discrete symbols and compositionality are the core of the coding system also pushed the more continuous, gradable aspects of language—such as those at work in affective prosody—to the fringe of the field. Linguistic meaning was acknowledged to have an expressive component (Lyons, 1977), but relatively few people working on syntax, semantics, and pragmatics actually went on to explore the affective side of language. The upshot of all this was that linguistics has inspired a lot of psycholinguistic research on how people crack the linguistic code (cf. all the research on lexical retrieval, syntactic parsing, anaphoric reference, and ambiguity resolution) and how they acquire or lose their code-cracking competence, but has *not* inspired psycholinguists to study how the code actually gets to *affect* people.

(3) *Modularity focus.* Third, even for psycholinguists who did acknowledge the importance of emotion to mental life, nothing of importance seemed to follow for their everyday scientific concerns. After all, wasn't the language system, or at least the most interesting bit of it, "informationally encapsulated" from the rest of mental life anyway? Jerry Fodor's highly influential 1983 book *Modularity of Mind*, where syntactic parsing was construed as a context-free, autonomous computational device, persuaded many psycholinguists to think of language processing in terms of autonomous feed-forward modules. Modularity thinking seemed to fit the psycholinguistic

evidence at the time, and also solved understandable concerns about feasible computation (cf. "combinatorial explosion"). Importantly, it provided an attractive research strategy, allowing researchers to study parts of the system (word recognition, parsing, and so on) without having to worry about other parts. Such modularity thinking also paved the way for thinking about language comprehension as computing what is said and implied *before, and cleanly separate from* computing the affective significance for the reader or listener.

(4) *Uniqueness focus.* As scientists carve up the world between them, it is only natural that people in different disciplines tend to focus on what is unique to "their" chunk of the world. What is obviously unique about human communication is the language code—no other animal has such a powerful discrete combinatorial system for referring to states of affairs at their disposal. What we have recently come to realize as equally unique about human communication is our capability for inferential communication (e.g., Tomasello, 2008), the ability to use *any* signal to communicate with conspecifics by relying on collaborative intentions, perspective-taking skills, and common ground. The unique aspects of human communication have drawn a lot of attention. However, psycholinguistics cannot focus on the unique only. Think about understanding how mountain bikes work, and how they afford transportation and fun. Relative to other types of bikes, a mountain bike is unique in such things as frame shape, gears, tires, suspension, and general robustness. But to understand how such a bike works and what it affords, studying just those features is not enough—you also need to understand how those special features mesh with more mundane ones, like a chain or a set of wheels. And so it is with linguistic communication: yes, the code and inferential machinery is pretty unique, but to understand how the system works, you also need to look at the parts that may *not* be so unique for *Homo Sapiens*, but are critical just the same, such as memory, or emotion.

These factors have shaped psycholinguistics in sometimes very fruitful ways, but they have simultaneously made it hard to see emotion as relevant to the field. As such, they have inadvertently led to a biased view on language use, framing people as dispassionate code users.

28.2.2 The code model position: Emotion is irrelevant to understanding language processing

In the standard code model of communication that dominates psycholinguistics, people are computational devices that exchange information via a fixed communication protocol, a human *TCP-IP* (transmission control protocol/internet protocol, the rules that regulate communication between computers connected via the internet). That protocol allows them to code ideas into utterances and transmit them for subsequent decoding at the other end, with the conversion to or from the code carried out by special language modules. Of course, no psycholinguist will deny that people have emotions, that they talk about them or say things because of them, that addressees or overhearers will have certain emotions as a result of such talk, and that all of this is deeply relevant to everyday life. At the same time, the code model of communication seems to render all of that irrelevant to the endeavor of

understanding language processing. After all, just like with the real *TCP/IP* on the Internet, what is conveyed through the code and why, and the impact that that content has "at the other end," is of no importance whatsoever to understanding the nature and processing of the code itself. The logic of this code model position can be articulated as follows:

(1) Language is a code via which we communicate about *everything*, for a principally infinite number of reasons, and to a principally unlimited number of effects.
(2) Psycholinguistics should study the *generic* mechanisms via which people acquire and use that code.
(3) *Other* disciplines, such as emotion science or social psychology, should study what happens when people communicate about the specific things they do, and why they choose to do so.
(4) Although psycholinguistics is connected to those other disciplines in virtue of people using language for everything, there's nothing about the interface that is really of relevance to the task of understanding the *generic* mechanisms via which people acquire and use language.

The logic is intuitively compelling. But is it correct? If human emotion is just a topic, a cause, or a consequent of specific instances of language use, cleanly separated from the machinery that does the language processing, psycholinguistics can just focus on the processing *regardless of emotion*. But is the separation really that clean? To assess this, we need to know more about emotion first.

28.3 EMOTION—A PRIMER FOR PSYCHOLINGUISTS

Here are some important facts about emotion that psycholinguists should know about, for reasons that will become obvious along the way. The starting point is a working definition that is suitable for current purposes.

> An emotion is a package of relatively reflex-like synchronized motivational, physiological, cognitive, and behavioral changes, triggered by the appraisal of an external or internal stimulus event as relevant to the interests (concerns, needs, values) of the organism, and aimed at generating a prioritized functional response to that stimulus event. The changes involved need not emerge in consciousness, but to the extent that they do, they give rise to feeling.

This definition (which largely follows Scherer, 2005, but also incorporates aspects of other proposals, notably Adolphs, 2017; Damasio, 2010; Frijda, 2008; Lazarus, 1991; Panksepp & Biven, 2012) highlights several core properties of emotion that I will unpack next. To help place those properties in context, Figure 28.1 provides a schematic model of how a specific emotion (or mix of emotions) unfolds in response to a stimulus.

(1) *Emotions are triggered by the appraisal of something as relevant to our concerns.* Emotions emerge when something about a stimulus is appraised as relevant to one's interests, either positively (such as when you win a contest, or see your child do well in a school performance), or negatively (such as when you are insulted, find a huge
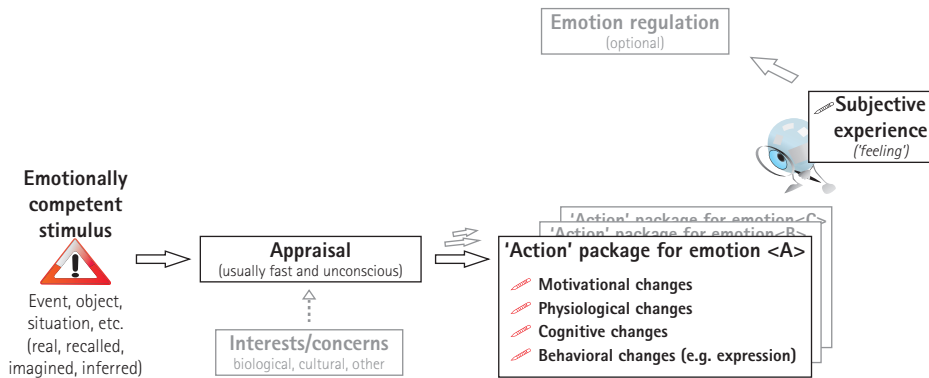
FIG. 28.1 Schematic model of the processing cascade that characterizes an unfolding emotion. Apart from the canonical stimulus → appraisal → action package cascade, the schema also indicates that appraisals always reflect how a stimulus relates to one or more interests or concerns of the perceiver, and that a stimulus can generate more than one emotion simultaneously. To the extent that ingredients of the action package (plus possibly of the appraisal) emerge in consciousness, the emotion at hand is accompanied by a subjective experience or "feeling," which in turn provides people with the possibility to regulate the emotion. The depicted processing cascade also pertains to affective evaluations.

spider in the crib of your two-month old baby, or drop your smartphone on the floor). An emotion is referential (i.e., *about* something). What it is about might be "out there," such as in all these examples, or inside your head, as when you remember or imagine any of these factors, or mentally represent these scenarios in response to language. That is, although examples in the emotion literature are often about concrete events, objects, or situations in our environment, *thoughts* (consciously as well as unconsciously entertained) can just as easily trigger emotion. Following Damasio (2010), I will use the term emotionally competent stimulus or ECS to cover all of this. Appraisal can to some extent be deliberate, (i.e., under slow conscious control), but in line with what emotion is supposed to do for us, it is usually fast, automatic, and unconscious (Adolphs, 2017; Frijda, 2008; Prinz, 2004; Scherer, 2005; Zajonc, 1980)—as every psychotherapist or coach will know, people often don't know what aspect of a situation, person, or event exactly triggered their emotion, and for what reason. Also, as illustrated by research on olfactory and visual perception (e.g., Li, Moallem, Paller, & Gottfried, 2007; Tamietto et al., 2009), people can respond affectively without having consciously *perceived* the stimulus at all.

(2) *Emotions involve a package of relatively automatic, short-lived, synchronized changes in multiple systems.* Emotion is not just about appraising something as relevant to your interests, but also about *doing* something about it. For example, when something makes you angry, your heart beats faster, you sweat a little more, and stress hormones are released, as your body is preparing itself for "combat." You'll momentarily feel a strong urge to act, and perhaps you will strike or yell at something, or someone. Your face will have an angry expression. Attentional focus will briefly narrow, such that you are no longer able to attend to other things in the environment. And finally, you

may become very aware of all of this, giving you the typical "feel" of anger. These specific changes make up the average package for anger. Qualitatively different emotions, such as anger and fear, have different action packages, with some shared ingredients (e.g., both increase sweating), but also some major differences (e.g., in contrast to anger, fear increases the probability of retreat and avoidance). Specific instances of anger may also differ somewhat in their exact "mix" of ingredients, and some mixes will be more prototypical than others. The key observation, however, is that emotions involve relatively automatic, short-lived, and synchronized changes along several different dimensions: (a) *motivational changes* or "*action tendencies*," the readiness to engage in, or disengage from, particular behavior; (b) *physiological changes* that prepare the body for action or impact; (c) *cognitive changes*, such as increased attention and better memorization; and (d) *behavioral changes*, involving approach or avoidance, as well as more specific actions such as smiling, frowning, shouting, crying, changing posture, stroking, exploring, or playing.

(3) *Emotions briefly take control.* Emotion emerges when something is deemed sufficiently important to relatively automatically engage multiple systems simultaneously, to have "all hands on deck." It is also about doing something *now*. Frijda (2008, p. 72) characterizes emotion as "event-or object-instigated states of action readiness with control precedence." That is, you really have an urge to do something *right now*: strike out or yell at the intruder, or write that email *now*. And that makes sense; after all, emotions are designed to watch over your interests, directly or indirectly rooted in core biological values shaped by evolution. Although culturally conditioned and other personal life experiences construct additional layers of emotional complexity that are unique to humans (Barrett, 2014), emotion is first and foremost about "biological homeostasis," about regulating life within survival-promoting and agreeable ranges (Damasio, 2010; Panksepp & Biven, 2012). Emotions are bits of rapid biological intelligence that have proved useful in the past, reflex-like solutions to recurring problems in the life of the species (and its ancestors), briefly taking control, but—provided that we become aware of them—also open to conscious regulation (Adolphs, 2017).

(4) *Emotions are not necessarily conscious.* A crucial insight in emotion science is that emotion doesn't need to be conscious (Damasio, 2010; Frijda, 2008; Panksepp & Biven, 2012; Scherer, 2005). That is, one can have all of the ingredients (a) to (d) mentioned in (2) without actually being aware of them (i.e., of *feeling* it). This may be counterintuitive, because in daily life we use "emotion" and "feeling" interchangeably. When *strong* emotions are elicited, we will certainly "feel" them. But what holds for other aspects of brain function also holds for emotion: most of the computations are done without us being aware of the process and of what they deliver (Adolphs, 2017). That is, weak emotions may unfold and affect our thoughts and behavior without *any* subjective awareness. If this is hard to imagine, think about moments in life when you suddenly become aware that you have been avoiding someone, or something, or that in particular situations, your neck muscles tend to tighten up. Or about the effort that is sometimes needed to make the relevant appraisals involved in your emotional life explicit, such that you can reflect upon them.

(5) *Emotions have ancient triggers but can hook up to new ones via learning.* For psycholinguists, a particularly critical observation is that there seem to be no limits on the

types of stimuli that can become emotionally competent. For a limited class of biologically significant stimuli (e.g., pain, an unexpected loud noise, signs of decay, being bodily restricted, the anticipation of sex or food, being otherwise cared for, the loss of social bonds, a helpless baby, and the basic emotional displays of conspecifics, such as smiles and frowns, aggression, or playful movement; Panksepp & Biven, 2012), that competence is simply hardwired into your brain. Via "emotional conditioning," however, an *infinite* number of other stimuli can also become emotionally competent (de Houwer, Thomas, & Baeyens, 2001; Hofmann et al., 2010; LeDoux, 1996), as generic categories, or as specific tokens. The amygdalae are crucial to such emotional conditioning, and they are capable of forging emotional associations without any awareness or episodic recollection of the coupling (LeDoux, 1996; Phelps, 2006). So, emotions are sticky little things, value-relevant response packages that can attach themselves to *anything* without you noticing, and with the appraisal that is needed to elicit them consisting of little more than the automatic retrieval of an acquired association from long-term memory.

(6) *Affective evaluation is low-intensity emotion.* In a wide variety of fields, ranging from social psychology (e.g., Zajonc, 1980) to the neuroscience of visual perception (e.g., Barrett & Bar, 2009), research has shown that we hardly ever see things in a neutral way: affective evaluation is part and parcel of how we perceive the world. In the words of Zajonc (1980, p. 154):

> One cannot be introduced to a person without experiencing some immediate feeling of attraction or repulsion and without gauging such feelings on the part of the other. (…) Nor is the presence of affect confined to social perception. (…) We do not just see "a house": we see "a handsome house," "an ugly house," or "a pretentious house." We do not just read an article on attitude change, on cognitive dissonance, or on herbicides. We read an "exciting" article on attitude change, an "important" article on cognitive dissonance, or a "trivial" article on herbicides. And the same goes for a sunset, a lightning flash, a flower, a dimple, a hangnail, a cockroach, the taste of quinine, Saumur, the color of earth in Umbria, the sound of traffic on 42nd Street, and equally for the sound of a 1,000-Hz tone and the sight of the letter Q.

Such automatic affective evaluations of the world around us build on the same affective systems that generate salient emotions like anger, fear, disgust, pride, or joy. With evaluation, however, the intensity of the emotion is so low that the response feels like a quality of the stimulus ("an ugly house"), rather than like a particular state that we are in ("that house made me feel disgusted"; see Barrett & Bar, 2009, for this distinction). Importantly, just like more salient emotions, evaluations have an action component (emphasized by the term "preference"): a more positive evaluation is associated with approach motivation, with—consciously or unconsciously—*preferring* the evaluated item over something else. Furthermore, these affective evaluations are by no means necessarily "*post*-perceptual," or "*post*-conceptual," that is, are not necessary generated only *after* something has been fully identified or conceptualized in cognitive terms. Echoing the classic psychological notion of subjective perception, there is growing evidence in cognitive neuroscience that what something *is* can often not be meaningfully separated from what it means *to me*—perceptions are not objective, and affect can be an intrinsic part of it (Barrett & Bar, 2009; Lebrecht et al., 2012).

(7) *Mood.* Mood differs from short-lived emotion in that it involves a relatively slow-changing affective background state that is not really *about* something (i.e., is not "referential"; Forgas, 1995; Scherer, 2005). Also, whereas short-lived emotions play their role via unique prioritized action packages, mood is believed to play a functional role in signaling the amount of resources available for exploration of the environment (Zadra & Clore, 2011), and/or for signaling that the current course of action is working out well (Clore & Huntsinger, 2007). The effects of this show up in differential patterns of action *and* cognition. For example, in a bad mood we are not only less inclined to climb a steep hill, but also inclined to overestimate the steepness of that hill (Zadra & Clore, 2011). Furthermore, a bad mood narrows the spotlight of visual attention (Rowe, Hirsh, & Anderson, 2007), and reduces such things as the width of associative memory retrieval (Rowe et al., 2007), the use of scripts in episodic memory retrieval (Bless et al., 1996), or the sensitivity to social stereotypes in person judgment (Park & Banaji, 2000). In all, mood tunes cognitive processing in a variety of interesting ways, again without us being aware of it.

Much more can be said about emotion, but for now, the central observation is this: Just like in other mammals, the affective systems that are responsible for emotions, evaluations, and moods are *key to the control of adaptive behavior in a complex environment* (Panksepp & Biven, 2012). Emotions, evaluations, and moods are "motive states," urging or nudging us to approach or avoid, prefer, attend to, explore, grab, attack, submit to, care for, play with, or protect oneself from entities or events out there in the world, all because of how those entities or events relate to our interests. They need not be very strong to exert this control, and we are often not aware of how they tug at us. But they do control what we attend to, what we encode and remember, what we mentally explore, how we reason, what we decide, and what we actually do. Rather than being orthogonal to it, emotion, in all its diversity, is *central* to cognition and action.

28.4 DRAWING A FIRST MAP: THE AFFECTIVE LANGUAGE COMPREHENSION MODEL

So where exactly are the interfaces between language and emotion? To address this question in a way that is useful for psycholinguists, we need to make explicit the various types of representations that people compute as they produce or comprehend language, as well as the subprocesses involved in computing them, such that we can subsequently ask where emotion might kick in. Such an articulate blueprint is crucial: if we are to make progress on how language processing and emotion interact, we must frame our research questions in ways that honor—and help us orient ourselves within—the real complexity of language processing, and move beyond relatively crude, holistic concepts like "word valence" or "emotional sentences."

Here, I present such a blueprint for language *comprehension*. We know from pragmatics and psycholinguistics that language comprehension is a highly complex business that extends beyond the single utterance, involves several layers of interpretation, and is heavily

context-dependent. We also know that language is just one of many simultaneous "channels" or sign systems via which we communicate, and that as we speak or write, such things as a flat voice, raising an eyebrow, a well-chosen emoji, or slightly turning away can make all the difference. The *Affective Language Comprehension* or *ALC* model, illustrated for one specific communicative example in Figure 28.2, is a theoretical model of how emotion can mesh with language comprehension, with the latter unpacked in a way that respects at least some of its complexity and richness. The model captures widely accepted ideas in three research domains: the psycholinguistics of word and sentence processing, the pragmatic analysis of communication, and emotion science. What is new here is that the three are combined.

28.4.1 Comprehending a rude verbal insult

The quickest way to get a feel for the model is to illustrate its claims with a clearly emotion-relevant expression, such as a rude verbal insult. Imagine a face-to-face conversation in which speaker X addresses listener Y by uttering "You are a real bitch!" in a very angry way. What representations does addressee Y retrieve or construct—consciously and unconsciously—in response to this, and how do these active representations move her?

28.4.1.1 *The input: Multimodal, composite signs*

In face-to-face conversation, conversational moves are always implemented as multimodal, composite signs, which include not just words arranged in a certain way, but a wide variety of non-verbal signs as well (Clark, 1996; Goodwin, Cekaite, & Goodwin, 2012; Enfield, 2013; Jensen, 2014). And in writing, we try to replace some of those signs (e.g., emoji, exclamation marks). Those non-verbal signs are *not* peripheral—a particular gaze direction, a specific gesture, bodily orientation, tone of voice, or facial expression may carry much, sometimes all of the speaker's meaning—as can an emoji. For example, speaker X inevitably utters "You are a real bitch!" in a specific manner (e.g., with a very angry voice and matching facial expression). Part of the composite sign, such as a trembling voice, may be unintended (a "symptom"), but for something to count as a communicative move, as least part of the composite sign must be presented deliberately, and this should be recognized *as such*, that is, addressee Y must recognize that X has a communicative intention (Tomasello, 2008).

28.4.1.2 *Recognizing/parsing the signs presented by the speaker*

The conventionalized ingredients of the composite sign will cue representations in long-term memory, traces of stable practices of sign use tracked by an ever-learning brain. For example, the spoken word "bitch" will cue (retrieve, activate) whatever stable memory traces addressee Y has stored for this sign in the mental lexicon, including additional phonological and/or orthographic form properties, its syntactic properties (e.g., singular noun), and its conceptual properties (e.g., that it can single out the class of nasty female persons, as well as the class of female dogs); this is what psycholinguists usually mean when they say a word is recognized. Specific *constellations* of words, such as idiomatic expressions, or other stable constructions, will likewise cue such representations in long-term memory (LTM) (Jackendoff, 2007).
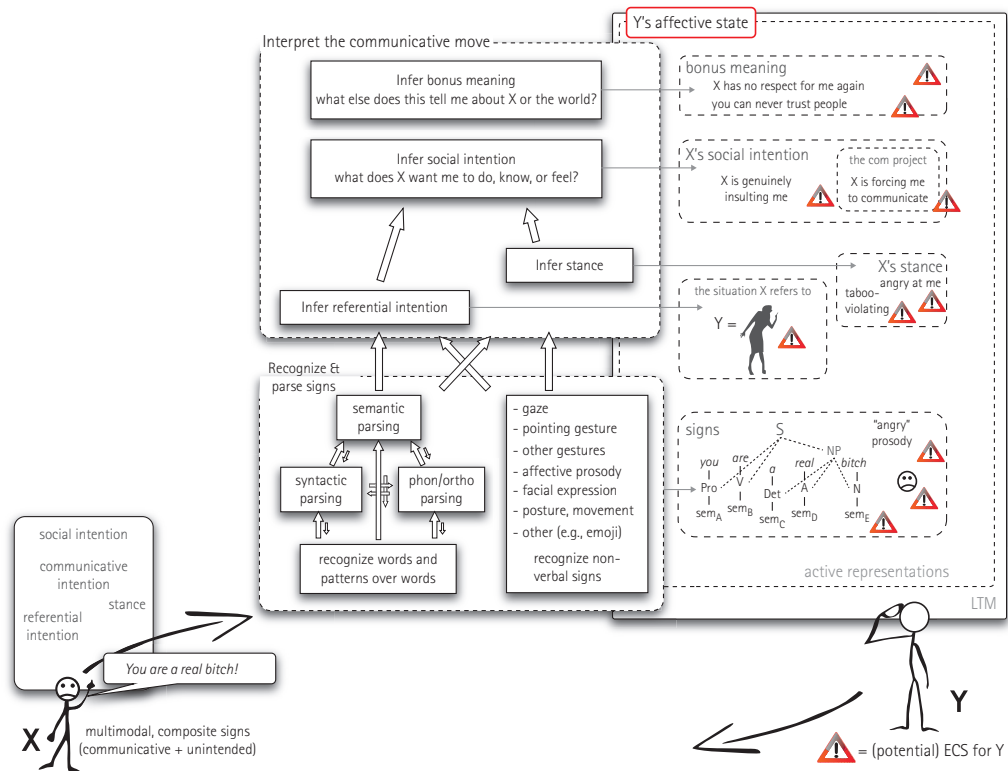
FIG. 28.2 Example processing in the *Affective Language Comprehension* model. Mental processes and the associated retrieved or computed representations are expanded for addressee Y only. Y's computational processes draw upon (and add to) long-term memory traces, and involve currently active dynamic representations that reflect what is currently retrieved from LTM, composed from elements thereof and/ or inferred from context, in response to the current communicative move. Y's active representations can be conscious or unconscious. Bonus meaning can be inferred from (or cued by) all other active dynamic representations, and Y's current affective state (e.g., mood) can influence all ongoing computational processes (arrows for these aspects not shown). The basic processing cascade is upward and incremental, starting from the signs, but small downward or sideways arrows between components of parsing and word recognition indicate top-down or sideways prediction or constraint satisfaction; such top-down or lateral contributions to processing can also occur between other components (arrows for the latter not shown). ECS = emotionally competent stimulus; com project = communicative project. *Each* of the illustrated potential ECSs can trigger an emotional processing cascade (see Fig. 28.1) that affects Y's inclinations, physiology, cognitive processing, and actual behavior, plus possibly Y's conscious feeling. Together with mood, these phasic changes also contribute to Y's current affective state, which provides a context for subsequent language processing.

The composite sign "You are a real bitch!" has a grammatical (phonological, syntactic, semantic) structure that Y will at least partially need to recover, a process often referred to as "sentence comprehension." For current purposes, I adopt the psycholinguistic analysis of Jackendoff (2007): addressee Y parses this composite linguistic sign by engaging in a parallel multiple constraint satisfaction process at several levels of grammatical structure simultaneously. Skipping over a lot of complexity here, the effect of this is that the context-free "sentence meaning" of "You are a real bitch!"—a structured semantic representation that reflects the prevailing conventions for using and arranging these verbal signs in the relevant linguistic community—is brought to bear on Y's specific, contextualized analysis of what the signs *really* mean. A rather large part of psycholinguistics has been about how people arrive at this timeless sentence meaning.

28.4.1.3 *Interpreting the speaker's communicative move*

The goal of language comprehension, however, is not to establish timeless sentence meaning, but to work out the contextualized "speaker meaning": what does *X* mean, *intend*, by presenting this composite sign to Y *here and now*? As indicated in Figure 28.2, these processes can take their cue from language, but also, and in principle no less powerful, from other types of signs, such as a pointing gesture, a particular glance, or an emoji. And, as forcefully argued by pragmatics researchers (Clark, 1996; Levinson, 2006; Scott-Phillips, 2015; Sperber & Wilson, 1995; Tomasello, 2008), the processes involved do not just tie up a few loose ends after syntactic and semantic processes have done all of the serious work—they are a crucial part of why our species has such powers of communication. In the subsequent sections, I discuss the main types of inferential processes involved, primarily based on Tomasello's (2008) analysis.

28.4.1.3.1 INFERRING THE SPEAKER'S REFERENTIAL INTENTION

One important ingredient of interpreting a communicative move is to infer the speaker's referential intention. For example, the intended referent of "you" may be the addressee but can, depending on exact circumstances, also be somebody else (including the speaker herself). Thus, addressee Y needs to use information that is already in common ground to work out what "you" currently refers to. Similar inferential work is needed to fix the intended meaning of "real" and "bitch," such that, depending on circumstances, the phrase refers to a member of the class of prototypical nasty female persons (rather than, say, of the class of female dogs). The result of all this work is a concrete mental model of the entire situation that speaker X is taken to refer to (e.g., informally: "addressee Y is an *exemplary* member of the class of nasty female persons"). In language processing research, such a referential model is commonly referred to as a *situation model* (Zwaan, 1999).

28.4.1.3.2 INFERRING THE SPEAKER'S STANCE

A second ingredient of interpreting a communicative move is to infer the speaker's stance, his or her orientation to a particular state of affairs or "stance object" under discussion (du Bois, 2007; Kiesling, 2011; Kockelman, 2004). Stance can involve aspects of the speaker's knowledge state, such as the degree to which he or she is certain about something being asserted (so-called "epistemic stance"). Particularly relevant here, however, is the speaker's *affective* orientation toward the stance object, (i.e., his or her emotion(s)). This *affective*

stance (or *evaluative* stance, Hunston & Thompson, 2000) can range from full-blown and clearly felt strong emotions (e.g., anger, skepticism, admiration, enthusiasm, playfulness) to very subtle, possibly wholly unconscious evaluations. Stance signals need not have been communicated *deliberately*, and can be part of the automatic, involuntary display of emotion (e.g., a trembling voice, gaze avoidance, a slight turning away of the body). Furthermore, while the stance itself is often detected relatively easily, what the stance is *about* is not always immediately clear. With "You are a real bitch!," the evaluative contents of the expression itself suggest that the person indexed by "you," or something about his or her behavior, is also the object of the negative stance cued by the speaker's angry intonation, angry face, and use of a taboo word. But in many conversational cases, things are less clear—with a mocking "look at *that* guy!" for example, the stance object being mocked might be the guy referred to, but also addressee Y instead[1].

28.4.1.3.3   INFERRING THE SPEAKER'S SOCIAL INTENTION

Addressee Y's mental representation of speaker X's referential intention and (deliberately or accidentally conveyed) stance jointly provide the basis for the third ingredient of interpreting a communicative move, the inferring of X's social intention: What is it that speaker X presumably wants to achieve by making this particular move, here and now? The specific options are unlimited. However, according to Tomasello (2008), speakers have three major types of social motivations for communicating with others, often mixed in the same move, but conceptually distinct: (1) *requesting (or manipulating)*: I want you to do (or know, or feel) something that will help *me*; (2) *informing*: I want you to know something because I think it will help or interest *you*; and (3) *sharing*: I want you to feel something so that we can share feelings together. Obvious verbal examples are "Please close the door," "Hey, you dropped your wallet," and "Isn't that a great view!" In the right context, similar intentions can be expressed by pointing to a specific open door, wallet, or view in a certain manner. Whatever the case might be, addressee Y needs to work out what speaker X wants him or her to do, know, or feel. With our example, addressee Y will most likely infer that X genuinely wants to insult her, and perhaps as such force her to repair or from now on refrain from specific bad behavior (a "request"). If the same expression is uttered in a playful way, however, Y may instead infer that X's intention is not to genuinely insult her at all, but to instead simply "fool around" and have some fun together, in ways that only intimate friends are allowed to do (Irvine, 2013; Jay, 2009).

28.4.1.3.4   THE IMPORTANCE OF RECOGNIZING A COMMUNICATIVE INTENTION

Communication always involves an additional "special" social project: not only has speaker X decided to use language and/or non-verbal signs to realize his or her primary social intention(s), but he or she must somehow make sure that addressee Y recognizes the communicative intention, and (implicitly or explicitly) agrees to the proposed joint *communicative project* for a certain amount of time. The nature of this special type of collaborative has been studied intensely in pragmatics (e.g., Clark, 1996; Enfield, 2013; Levinson, 2006;

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[1]   Situations where we feel compelled to (usually apologetically) explain to our interlocutor that the negative emotions they may pick up "are not about them" also illustrate the ambiguity in what someone's stance is *about*.

Tomasello, 2008), and has among other things led to the famous Conversational Maxims (Grice, 1967), as well as to a deep understanding of the importance of common ground. Interestingly, it also means that when X intends to verbally insult Y, this can only work if Y recognizes X's communicative intention, and assumes that the utterance is "collaboratively" designed by X such that Y can recover the referential and social intention. That is, people need to collaborate even if they want to hurt each other.

28.4.1.3.5 INFERRING BONUS MEANING

Working out speaker X's referential intention, stance, and social intention (and recognizing his or her communicative intention as a special case of the latter) completes the process of inferring or understanding *speaker meaning*, that which the speaker aims to convey or bring about. Some would argue that language processing stops there (e.g., Clark, 1996). But regardless of such discipline-based demarcation lines, *processing* doesn't of course stop there—addressee Y will consciously or unconsciously always infer (via associative memory retrieval or more sophisticated computation) at least some additional "bonus" meaning, things that X did not mean to convey at all, about speaker X (e.g., "she is always so blunt," "she obviously had a bad day"), the relationship between X and Y (e.g., "X doesn't respect me"), and the rest of life (e.g., "they never respect me," "why do people always need to put other people down?"). Although not part of speaker meaning proper, such bonus meaning will usually strongly contribute to whatever Y will think, feel, do, or say next.

28.4.1.4 *Other issues*

Because the power of language to a large extent resides in its referential precision, it is tempting to assume that *verbal* signs drive inferences about the speaker's referential intention, and *non-verbal* signs drive inferences about the speaker's affective stance. However, this is by no means necessarily the case. Referents can be signaled verbally but also entirely non-verbally, by such means as eye movements, manual pointing, or an iconic gesture (Tomasello, 2008). Also, stance can be expressed through such non-verbal signs as tone of voice, but also by one's choice of words and constructions, in a wide range of subtle and less subtle ways. Examples of the latter (Besnier, 1990; Enfield, 2013; Foolen, 2012, 2015; Kiesling, 2011): using intensifiers (e.g., "very," "horribly"), interjections (e.g., "ugh," "wow," "yeah," "uhh") and swearwords to express strong involvement and positive or negative affect, using specific referential expressions to mark affiliation or distance (e.g., French "tu/vous," first names vs. surnames, demonstrative pronouns as in "I'm fed up with those people next door!"), a diminutive or other suffix to convey affection or express a negative evaluation, constructions such as "Obviously, . . . " to express annoyance at somebody else's powers of inference, "dude" to express cool solidarity, or "just" to express non-commitment. The division of labor between how verbal and non-verbal parts of the composite sign signal referents and stance can change with every utterance. In fact, and important to keep in mind, the comprehension process depicted in Figure 28.2 can also work without language (Levinson, 2006; Tomasello, 2008), as when we communicate something with a well-timed silence, a raised eyebrow, an emoji, or a sigh.

Three more things about the inferences involved in interpreting communicative moves. First, although at least some of the inferred intentions (e.g., the presence of a

communicative intention) must emerge in the listener's awareness for this to be a model of inferential communication, the "inferring process" itself need not be a conscious, deliberate process, and some of the resulting inferences may also escape awareness; this is simply an echo of the much more general observation that much of the brain's processing is *unconscious* processing. Second, addressees may infer more than a single social intention, and more than a single stance, as well as a whole range of bonus meanings. Third, and important, what the addressee infers is not necessarily correct. Inferential communication is flexible but also vulnerable, in that addressees may be mistaken about the speaker's intended referent, stance (or object of that stance), and/or social intention(s), and may in addition derive all sorts of bonus meanings that are totally unwarranted. In the current context, the upshot is that there is room for a lot more emotion than what "perfect message transfer" would already elicit by itself.

28.4.2   Where are the emotionally competent stimuli, and what do they do?

So, which of the representations retrieved or computed in response to our example utterance can be an ECS to Y? The answer suggested by the ALC model is: *all of them*.

(1)   If addressee Y infers that X's *social intention* is to genuinely insult her, this representation of X's communicative move will most certainly be a powerful ECS, capable of triggering various negative emotions (e.g., anger, shame, fear). This is no surprise: the representations that we construct for an interlocutor's social intention are usually emotionally competent, and sometimes very strongly so—after all, it is at *this* level that we deal with each other, where we affiliate ourselves with or distance ourselves from others, as individuals or group members. We warm to the thought that somebody is really trying to help us ("hey, you dropped something"), get annoyed or intimidated if somebody scolds us ("I'd appreciate if you'd be a little more thoughtful next time . . . "), and can resonate to somebody's attempt to connect with us via shared feelings ("Yeah, *Netflix* is really awesome!"). Note that the same utterance can realize very different social intentions. If taken as a genuine insult, "You are a real bitch!" can lead to negative emotions, but if we think the social intention behind the utterance is playful and benign teasing, this can elicit much more positive emotions.

(2)   Addressee Y's perception of, or inferences about speaker X's *affective stance* will be a potent ECS as well, independent of the specific social intention ascribed to this particular move. That is, the stance signaled by X's angry prosody, angry facial expression, and use of taboo language will usually by itself already elicit emotional responses in Y, regardless of whether Y has worked out the specific social intention, or even the exact stance *object*. We are immediately sensitive to the emotional displays of our conspecifics, via various evolutionarily sensible routes. These include several aspects involving empathy (Decety & Cowell, 2014)—simple emotional sharing ("resonance," "mirroring," "emotional contagion"), empathic concern ("caring for"), and affective perspective-taking (i.e., more deliberately imagining somebody else's feelings)—as well as various other rapid interpersonal interlockings of social emotions (Fischer & Manstead, 2008), such as when rage

instills fear, admiration instills pride, and contempt instills shame, at least initially. Stance is also a major dimension in affective alignment between speakers in conversation (du Bois, 2007; Kiesling, 2011), and discovering that a speaker clearly shares—or does not share—your stance on something will often elicit non-trivial emotion. Finally, although somebody's inferred affective stance will as a rule act as an ECS, somebody's *epistemic* stance can do so too, as in the case where the speaker's uncertainty over what he or she asserts elicits irritation, or compassion instead.

(3) Independent of the speaker Y's social intention and stance, the *referential situation* that she draws the addressee's attention to can *itself* be emotionally competent. An obvious example is "She drove the knife into her husband's belly and slowly twisted it around," which will for many people lead to an unpleasant model of the situation referred to. The example in Figure 28.2 is similar, in that the description of a state of affairs in which you are depicted as a particularly nasty person is for most people an unpleasant state of affairs to consider. The ALC model predicts that this can generate its own bit of negative emotion. In the case of a negatively construed social intention (X *really* wants to insult me), the impact of the *referential* intention may not be all that noticeable. But in the case where "You are a real bitch!" is construed as an act of playful and benign teasing, the situation referred to (you as a real bitch) can *still* be an ECS for negative affect. This provides an explicit account for why friendly teasing can still sting, and as such lead to mixed emotions[2].

(4) When speaker X uses words to describe a situation to addressee Y, the referential aspects of the meaning of each of those words controls Y's construction of the situation model. However, merely *retrieving word meaning* from long-term memory can itself also activate the addressee's affective system (e.g., Foroni & Semin, 2009), regardless of the specific referential (and other) intentions being inferred. Swearwords are an easy example. Outside of the special conversational domain of dog species and sexes, a word like "bitch" is a taboo word, that is, a word we are not really supposed to use (Jay, 2009). Of course, people use them anyway. But we have all been taught not to, sometimes rather drastically. If you have been raised in a family culture that places a strict ban on the use of swearwords like "bitch" (e.g., you'd be forced to wash your mouth with soap whenever you used it), for example, this is bound to turn those words into emotionally competent stimuli. Furthermore, your ever-learning brain will inevitably track the extent to which particular words are used to express or evoke strong emotion in other people; via emotional conditioning, this too will contribute to the emotional competence of a swearword. The ALC model predicts that swearwords elicit emotion regardless of the current speaker's *specific* referential and social intention, such that even totally benign utterances such as "I'm so glad you are not like that bitch" can trigger a bit of negative emotion, purely because of the emotional component of individual sign meaning. Recent electroencephalography (EEG) evidence that insults with swearwords like "bitch" elicit a very early context- and repetition-insensitive brain response (Struiksma, de Mulder, & van Berkum, 2017), independent

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[2] Another possible account for the mixed impact of "friendly" teasing that the ALC model allows us to make explicit is that addressee Y discerns *two* simultaneously present social intentions: friendly play mixed with unfriendly criticism. People are complex and layered enough to have such mixed social intentions.

of whether the participant or somebody else is the target (as in "<Participant-name> is a bitch" vs. "<Other-name> is a bitch"), is in line with that prediction. In section 28.5, I return to this issue in a more generic analysis of word valence.

The ALC model allows for two more sources of emotion in addressee Y, as he or she processes X's utterance[3].

(5) One is *the communicative project* proposed by X, which Y may or may not be in the mood for regardless of its contents—if X is bugging Y while she is very tired, or trying to concentrate on something of vital importance (e.g., making a left turn in very heavy traffic), for example, X's proposal to communicate can easily be met with reluctance, or irritation, regardless of the exact social intention. If Y would rather not interact with X at all, X's communicative intention would be similarly evaluated. The example unpacks this in the context of a face-to-face exchange. But emotion over the communicative project is also what controls our willingness to study, say, an information folder, or an annual report.

(6) The other is at the level of *bonus meaning*, additional inferences that are *not* part of the speaker's intended effect, but are simply triggered by the speaker's communicative action anyway. Although heavily context- and person-dependent, "bonus thoughts" like "People like that simply never respect people like me," "Everybody always rejects me," or "I must be doing something wrong again . . . " provide a rich source of emotion as we communicate with others, perhaps the richest of all potential sources discussed in the ALC model. It is also here where frequent unwarranted thoughts can lead to emotionally dysfunctional habits, and as such can become a useful target for therapeutic interventions (e.g., Greenberger, Padesky, & Beck, 2015).

In all, what the ALC model predicts is that an utterance such as "You are a real bitch!" can generate emotional responses in the addressee (or, for that matter, an overhearer) at *all levels of analysis* exemplified in Figure 28.2. At each of these levels, the emotional response can in turn have a wide variety of specific effects on the addressee, of the types laid out in Figure 28.1, and including such things as an angry reply, a frown, a rise in heart rate, or a vivid memory. *Which* specific effects occur depends on the exact details of the exchange and those involved—the model lays out the complexity, but does not predict the outcome of specific instantiations. In situations where the context does not allow for strong top-down anticipation, the ALC model does predict that (all else equal) an emotional response to retrieving a sign's meaning from the mental lexicon should emerge a little earlier than an emotional response to somebody's referential intention and stance, which should in turn emerge a little earlier than an emotional response to the speaker's social intention[4]. As reviewed before,

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[3] In the model, "Y's affective state" serves as a reminder that pre-existing mood as well as language-elicited emotions or evaluations can also affect ongoing language processing (see, e.g., van Berkum et al., 2013, for example evidence for mood effects; and van Berkum, 2017, for a corresponding ALC analysis).

[4] The timing of emotional responses that hinge on bonus meaning depends on whether the latter is inferred from, say, the speaker's referential intention (e.g., "what kind of person describes a murder so vividly?"), the social intention (e.g., "what kind of person insults other people?"), or something else in the processing stream.

each of these responses involve changes in action readiness and physiology, changes in such things as attention, memory, and decision-making, and actual behavior (approach or avoidance, frowning, playing, and so on). As such, the ALC model provides us with a detailed map, grounded in psycholinguistics, pragmatics, and emotion science, of where and how the "perlocutionary effects" of an utterance can arise.

28.4.3   The scope of the model

I illustrated the ALC model with an utterance containing a taboo word, because it is the easiest way to make this point. However, the analysis and associated predictions hold for *any* instance of communication, albeit with details that may differ (such as in the strength of the emotional response, and, related, whether the addressee is conscious of it). For example, non-taboo utterances such as "we are out of coffee," "people are talking about you," or "The British people just decided to leave the EU" can be emotionally evocative because of the speaker's referential intention, that is, the situation model, as well as potentially the speaker's social intention (see Lai, Willems, & Hagoort, 2015, for relevant evidence of referentially induced affective systems engagement). Other non-taboo utterances are primarily evocative at the social level, such as when you invite somebody over to restore a relationship that has gone bad, and receive an indirect evasive reply like "I'm kind of busy these days" (see e.g., Bašnáková, van Berkum, Weber, & Hagoort, 2015, for relevant evidence on affective systems engagement induced by face-saving indirect replies, as well as an associated ALC-analysis). Even apparently rather neutral utterances like "The number seven is also a prime number" can elicit traces of emotion at one or more levels of analysis (see van Berkum, 2017, for this example, as well as for an application of the ALC model to several neurocognitive studies).

The model can be applied to spoken or written conversation as well as text (including blogs, information leaflets, news reports, advertisements, and speeches) and also offers a framework in which to analyze the affective impact of such things as emoji in texting, spelling errors in student papers, co-speech gestures, expressions and posture, or the fictional adventures of other people that we can read about in a novel. The latter case is interestingly complex, in that the model not only applies to the communication between author and reader, but also to communication involving characters in the story world (and, possibly, a narrator).

Finally, although the current exposition of the ALC model is focused on exploring the various types of sign-elicited representations that can be emotionally competent stimuli, the model also provides a framework in which to conceptualize more indirect effects related to framing, an important—if somewhat fuzzy—concept in the science of persuasion (Scheufele & Iyengar, 2012). One possibility suggested by the model, for example, is that value framing, the shaping of audience responses by having the message resonate with specific value orientations, does its work via the targeted foregrounding or 'priming' of specific interests/concerns that thereby increase their impact on the emotional appraisal process (cf. Fig. 28.1), as such changing the particular emotion(s) elicited by the same stimulus. A statement such as, "We need to take action on climate change", for example, could in this way elicit a very different emotional response, depending on whether the previous framing emphasized, say, a fairer world, economic stability, or the security of one's family (all this in interaction with a person's pre-existing value orientation; Corner & Clarke, 2017). Applying the model to

framing, or other phenomena studied under the umbrella of rhetoric and persuasion, may well help refine our understanding of those phenomena, and may simultaneously shape and extend the model itself.

28.5 IMPLICATIONS FOR THINKING ABOUT WORD VALENCE

An important claim of the ALC model is that emotion can not only be elicited as soon as the addressee has worked out the current speaker's specific stance, referential, and/or social intention, but also when *the meaning of individual signs is retrieved*, very early in the processing stream. This is where the concept of *word valence* becomes relevant. Psycholinguistics has heeded word valence for a long time (Osgood, Suci, & Tannenbaum, 1957), most often to control for a nuisance factor in code-oriented language processing experiments, but more recently also to study the impact of emotion in language (e.g., Citron et al., 2014; Kuperman, Estes, Brysbaert, & Warriner, 2014; Recio, Conrad, Hansen, & Jacobs, 2014). Word valence is easily quantified in ratings ("rate to what extent these words are positive or negative"), but what it means to say that a word is positive or negative is not all that clear. Because it articulates the various emotionally competent representations that are dynamically computed during comprehension, however, the ALC model provides a principled take on the issue.

As illustrated in Figure 28.3, what follows from the model is that a word or any other communicative sign (e.g., an emoji) can in principle acquire valenced meaning for a particular person P when that sign is sufficiently reliably, and sufficiently selectively:

(1)   used by speakers to *refer* to objects, actions, situations, or events that are emotionally competent for P;
(2)   used by speakers to signal *stances* that are emotionally competent for P;
(3)   used by speakers to signal *social intentions* that are emotionally competent for P;
(4)   paired with specific *bonus meanings* that are emotionally evocative for P; and/or
(5)   observed by P to intentionally or accidentally elicit emotional responses *in other people*, responses that are in turn emotionally competent for P (with P being an overhearer, or the speaker him/herself).

Sufficiently reliable, selective pairing guarantees that emotions elicited on any of these five grounds in P *at particular occasions* can begin to stick to P's representation of the sign meaning, as an unavoidable consequence of emotional conditioning, and independent of whether P is aware of the relevant appraisal, the elicited emotional response, and/or the learning process that it gives rise to.

Examples of words with clearly valenced *referential* meaning include such words as "torture," "sex," "anger," "holidays," or "love" (for almost all people), "abortion," or "euthanasia" (for a strict Christian), or "dog" (for a dog lover): these words have acquired positive or negative valence for particular language users because their referents are ECSs for positive or negative emotion for those users. A swearword like "bitch," however, exemplifies three
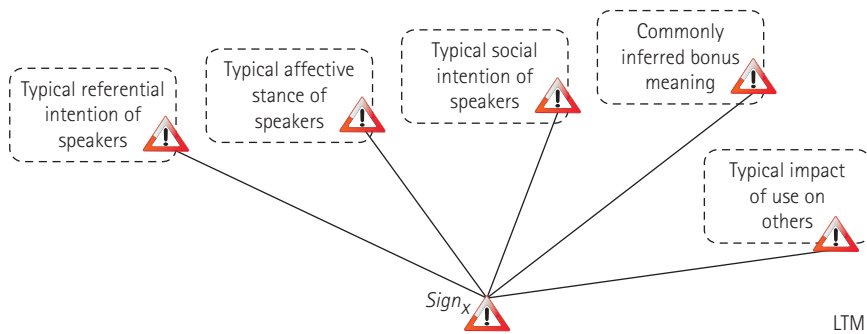
FIG. 28.3 Five potential ingredients of stable (and in four cases possibly conventionalized) affective sign meaning in long-term memory, derived from core elements of the Affective Language Comprehension model.

other types of valenced meaning, where the relevant ECSs involve the speaker's perceived social intentions (often insulting) and stance (strong enough to violate a taboo) as well as the observed consequences of a word's use (e.g., strong rejection from parents, educators, other members of society). Some swearwords seem to derive their stable evocative potential from all just mentioned sources. For example, the Dutch equivalent of the word "cancer" ("kanker") refers to something really bad (a life-threatening disease), most speakers use it as a swearword only when something *really* matters to them, the social intentions in those cases are often interpersonally "violent," and addressees or overhearers often strongly frown upon the disrespectful use of this word. According to the ALC model, all of these ingredients together determine this particular word's valence. More importantly, according to the ALC model, *every* word can accumulate *some* valence along these lines, subtly or obviously, and with us being aware of it or not.

Of course, within a specific linguistic community (or other sign-using community, e.g., those texting with emoticons and emoji), the affective traces accumulated for person P need not be the same as for person Q. For example, whereas the word "bachelor" refers to the set of unmarried men for all speakers of English, and as such has a clear conventionalized referential meaning, the emotional "connotations" will vary across those speakers, and as such fail to show up in lexicosemantic analyses of shared word meaning. Also, commonly inferred bonus meanings will differ wildly for different persons (e.g., a specific word that for whatever reason has often induced emotionally evocative thoughts such as "I'm always doing things wrong" in one person, e.g., "sloppy," may not do so for the next person), and will as such not be conventionalized in a linguistic community. But, importantly: the *brain* doesn't care (see van Berkum, 2010); if a word has stable affective meaning *for you*, you will be affected by it, whether or not that meaning is conventionalized in a wider community. Furthermore, the existence of valence norms for large parts of the mental lexicon of a given language (e.g., Moors et al., 2013; Warriner, Kuperman, & Brysbaert, 2013) suggests that emotional meaning *is* to some extent shared. Again, swearwords are an easy example: they are taboo words by definition (Jay, 2009), and will as such reliably elicit emotion when used, across large parts of a language community. But within certain smaller communities, words like "abortion," "refugee," or "dog" will also elicit shared (i.e., within that community "conventionalized" emotion).

Either way, when speaker S uses a sign X that has stored and relatively unambiguous affective meaning for you, that emotional payload can impact your processing at a very early point in time, as your first guess at (i.e., prediction of) what the sign will mean and bring about in *this* particular context, with *this* particular speaker, and in *this* particular arrangement of other signs. That first memory-based guess will usually be overruled by more precise context-dependent analyses of the speaker's current referential meaning, current social meaning, current stance, as well as of the actual specific impact of the utterance in this situation. However, the ALC model predicts that the rapid retrieval of sign-associated memories of affective meanings computed in past analyses—if available— will nevertheless contribute to the emotional impact of a communicative move, with the effects particularly likely to show up very early in processing (see Struiksma et al., 2017, for an EEG example).

This analysis of the relationship between emotion and language processing at the sign level, clearly situated within a more general framework for grounding meaning (Barsalou, 2008; Glenberg & Kaschak, 2002), makes two important points. The first is that, in fundamental contrast to artificial codes such as *TCP/IP*, the human language code is not a dead, static code. Like its users, the language code is *alive* and self-learning, incorporating emotions and other experiences into sign meaning whenever there is enough regularity. Second, and related, during language comprehension, emotion does not just come into play after the code has done its work. According to the ALC model, words and other signs can inject various types of valenced meaning, and hence emotion, into the processing stream right at the beginning, just like affective predictions can be an intrinsic part of object perception (Barrett & Bar, 2009). The implications for understanding how language influences people as it unfolds, the subject matter of psycholinguistics, are profound.

28.6 Toward a richer psycholinguistics

In this chapter, I have presented a theoretical model of how emotion can mesh with language comprehension, with the latter unpacked in a way that respects at least some of its complexity and richness. I have borrowed widely accepted ideas from three research domains: the psycholinguistics of word and sentence processing, the pragmatic analysis of communication, and emotion science. What is new is just three things: the combination of a psycholinguistic theory of sentence processing (Jackendoff, 2007) with a pragmatics theory of verbal and non-verbal inferential communication (Tomasello, 2008), the subsequent combination of this extended language processing framework with insights about how emotions and evaluations are elicited, and the use of insights about emotional conditioning to derive some implications for stored sign meaning.

In the introduction, I argued that if human emotion would be cleanly separated from the machinery that does the language processing, psycholinguistics could just focus on the processing regardless of emotion. However, the ALC model makes clear that the separation is not that clean at all, and that, as language processing unfolds, emotion can play a role in *every* component of the language comprehension process, all the way down to the retrieval of stable code meaning. Of course, I have not provided much empirical evidence that this core ingredient of the ALC model is correct. However, it does fall out naturally, as soon as well-established ideas

on the types of representations retrieved and/or computed as part of language comprehension are combined with well-established ideas on what emotion is, how it can be elicited, and what it can do. The relevant facts about emotion are by no means uniquely human. For instance, we share many emotions with other Great Apes, and our susceptibility to emotional conditioning with Pavlov's dogs, Skinner's pigeons, and the modern lab rat. But that doesn't make emotion less interesting, or less important—quite the contrary. What has gone wrong is that in psycholinguistics, we have implicitly assumed that, thanks to all the referential precision made available by human language, emotion is somehow not so relevant anymore.

Certainly, we are great at computing wildly flexible discrete compositional structures such that we can refer to just about everything with great precision, in fictional worlds or the real one. But we are also something else: alive and highly social, using language to influence each other, and share what we care about. Psycholinguistics may choose to ignore this, and stick to a *lean and mean* definition of the field. But if the research in that field continues to treat people as dispassionate code-crackers, it will never get the bigger picture. Without a proper interface theory, language processing models are as disembodied as the classic models of early-days cognitive science: residing safely in the mind, but with no effective relationship to the real world in which that mind is supposed to operate. Psycholinguists need to understand why language *works* (i.e., how it does not only inform but also *affect* other people). In that puzzle, emotion is not peripheral, but the key.

Acknowledgments

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