some control over our own memory loads during language production. The bottleneck also isn’t always so severe in comprehension, and chunking isn’t as uniformly easier as C&C portray. Downstream linguistic input affects interpretation of earlier material (MacDonald 1994; Warren & Sherman 1974), which shouldn’t occur if chunking greedily passes off the early information to the next level. Variability in the tolerance of memory loads suggests that the bottleneck is really nothing more than a wide-mouth jar, or perhaps more of an adjustable drawstring closure, and the consequences for the nature of language will therefore need adjustment as well.

Similarly, C&C view the lossy nature of Chunk-and-Pass processing as essential to explaining the nature of language processing, but chunking is neither as lossy nor as bottom-up as they suggest. C&C argue that in speech perception, sounds are rapidly chunked into words, leaving the sounds behind, so that the just-perceived sounds do not interfere with upcoming ones. These claims create several puzzles: First, this very bottom-up characterization of chunking is inconsistent with evidence for top-down influences in perception. C&C’s focus on using context only for predicting the future is misplaced, because top-down processes also allow higher-level information to elaborate earlier perceptions. Examples include the word superiority effect (Cattell 1886) and the phoneme restoration effect (Warren 1970), in which word representations affect perception of their parts (letters, phonemes). If chunking is so eager and lossy, it’s not clear how higher-level word information could refine the lower-level perceptual cues that should have already been discarded by lossy chunking. Second, if the memory bottleneck is so narrow, how is there room for interference, which by definition depends on several elements being in memory at the same time? There are numerous examples of semantic and sound overlap creating memory interference over fairly long distances during both comprehension (Acheson & MacDonald 2011; Van Dyke & Johns 2012) and production (Hsiao et al. 2014; Smith & Wheelton 2004), again suggesting that the bottleneck can’t be as strict at C&C describe. Third, if lossy chunking is the solution to memory interference, why is it so easy to find interference effects? The existence of memory interference suggests that chunking may not always be so lossy after all. In at least some circumstances, there appears to be real value in non-lossy processing, such as the Levy et al. (2009) example that C&C note as well as use of prosodic information over long distances (Morrill et al. 2014). These and other examples call into question the essence of lossy, greedy, bottom-up chunking as a design feature for language.

C&C note some variability in memory limits and chunking, but they do not discuss the consequences of variability for their account. They illustrate their ideas with an individual identified as SF, who can recall vast strings of meaningless digits by chunking them into meaningful units such as dates, and using the chunks to guide production. The analogy to language is unfortunate, because SF’s chunking strategies are both conscious and idiosyncratic, inviting the inference that language users’ chunking units are similarly variable. In sum, if memory limitations and the lossy and eager characteristics of chunking have notable exceptions and are subject to individual differences, then it is difficult to make them the foundation of claims for the nature of human language.

More seriously, no matter how we conceive the memory bottleneck, it can explain neither the existence of a hierarchy in language representations, nor why the hierarchy has certain levels of representation across individuals and not others. Consider a non-linguistic analogy: the visual processes necessary to recognize a cup. Let’s assume that these processes, also constrained by memory bottlenecks, have multiple stages of chunking and passing from low-level visual processing up to object recognition. From these perceptual stages, however, we would not want to conclude that the percept itself, the cup, has a hierarchical structure. Similarly, the memory-constrained chunking and passing
Exploring some edges: Chunk-and-Pass processing at the very beginning, across representations, and on to action

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Abstract: We identify three “working edges” for fruitful elaboration of the Chunk-and-Pass proposal: (a) accounting for the earliest phases of language acquisition, (b) explaining diversity in the stability and plasticity of different representational types, and (c) propelling investigation of action processing.

Experience is dynamic and ephemeral, yet humans routinely generate abstract representations of their individualized experience that simultaneously achieve enough stability, plasticity, and interindividual parity to radically facilitate social and cognitive functioning. Christiansen & Chater’s (C&C’s) ambitious Chunk-and-Pass processing (CPP) proposal offers hope of a comprehensive and elegant account of how this can be. CPP has impressive explanatory breadth, neatly tying language acquisition to language change and elegant account of how this can be. CPP will be its ability to account for the phenomena documented in different representational types, and on to action processing. Intuitively, language and action processing seem closely linked. Language can be regarded as one form of action, after all, and all language and action are subject to the Now-or-Never bottleneck, making them amenable to CPP account, as C&C themselves note. Strikingly, however, investigation regarding action processing lags considerably behind language. One glaring example is the lack of a generally accepted inventory of basic actions, comparable to inventories of phonemes or syllables in language (cf. interesting but small-scale efforts along these lines, such as therblig, Gilbreth & Gilbreth 1919).

Another example concerns hierarchical structure, which seems to be a a fundamental organizing principle of both action and linguistic representations. To illustrate in the action context, observers typically note that an action such as getting a cup of coffee comprises embedded subgoals, such as getting a mug from a cupboard, placing it on a counter, pouring coffee into the mug, and so on. At the same time, relevant levels of that hierarchy seem not to be as crisp or well-defined as they are in language. A “learning to process” account may provide welcome guidance for continuing attempts to gain purchase on the