J. Child Lang. **31** (2004), 247–253.
Printed in the United Kingdom

REVIEW

DOI: 10.1017/S030500090300597X

GREGORY L. MURPHY, *The big book of concepts*. Cambridge, MA: MIT Press, 2002. Pp. 563. ISBN 0-262-13409-8.

Categorization of the world may be considered the fundamental psychological task of development (Thelen & Smith, 1994). Nonetheless, the nature of conceptual knowledge, a 'phenomenologically simple cognitive process … turns out to be maddeningly complex' (Murphy, 2002, p. 2). Accordingly, the psychology of concepts has grown ever more diverse, unable to find a common ground on which to consign the accumulation of empirical and developmental evidence and theoretical notions. This, in turn, raises many theoretical and empirical problems concerning the relationship between conceptual development and language development. In *The big book of concepts*, Gregory Murphy plunges directly into this upheaval to impart and unify the status of the psychology of concepts. Although written at an introductory level, the comprehensiveness of the book, as well as Murphy's willingness to explore deep-seated psychological issues, provides a good background for those child language researchers who are not conversant with the conceptual literature.

Overview

Generally, Murphy advocates a four-point premise: (1) concepts must be primarily prototype-based; (2) the description must be part of a knowledge-based representation scheme, in which concepts are positioned within both a structural hierarchy and a broader theoretical framework; (3) representations are schemata, rather than traditionally assumed feature lists; and (4) the role of exemplars may be best accounted for within the context of episodic memory. These themes are interwoven into a hybrid approach to conceptual representation, which posits 'parallel memory for exemplars in addition to the more purely conceptual prototype memory' (p. 491). Murphy argues convincingly that the very nature of human thinking – our flexibility and multi-faceted, diversified basis for behaviour – is not only congruent with but demands such an approach.

The opening chapters describe three prevalent conceptual theories, differing primarily in their respective characterizations of conceptual representation. Specifically, the exemplar view considers concepts to be represented in terms of individually remembered exemplars; the prototype view regards concepts as unified 'summary representations' abstracted from each category member; finally, the knowledge-based approach argues

that concepts are part and parcel of our general knowledge about the world. In sketching these conceptual frameworks, Murphy reports being 'increasingly uneasy about the particular theoretical disputes that have characterized the field' (p. 4). He cautions that 'for real-life concepts, we would do best not to assume that a single form of conceptual representation will account for everything' (p. 65). For example, the exemplar approach, while accounting well for empirical data from category learning experiments, experiences serious problems in explaining the more abstract phenomena of hierarchical structures, induction, conceptual combination, and word meaning. The prototype view, on the other hand, sits quite well with these phenomena; its weak point lies in the lack of computational modelling presented to date. Finally, the knowledge approach complements both the prototype and exemplar accounts; yet, in its current form, it is able to imply little more than a nonspecific adjunct to these theories.

Following the introductory material, Murphy delves into a provocative review of exemplar effects, including formal models proposed to compare specific instantiations of exemplar theory. He raises questions regarding the cost to ecological validity that is engendered by these models, providing a sense of the struggle between specific theoretical approaches and the complicated phenomena for which they must account. As an alternative, he offers 'implicit memory' as a cogent explanation for what others have attributed primarily to exemplar effects. What is especially striking is Murphy's distinction between the CONTENT OF and ACCESS TO concepts: he argues that exemplar effects may be realized primarily in concept access rather than in stored content or use. It is noteworthy that similar divisions have been proposed in a number of developmental and cognitive neuropsychological accounts of language (e.g. Gerken, 1994).

In subsequent chapters, Murphy reviews an assorted mix of related categorical phenomena, all the while encouraging researchers to 'broaden their approach to category learning, taking into account the richness of our interactions with the world' (p. 140). Murphy provides the scaffolding by reviewing a synopsis of issues subsumed under the general heading of 'knowledge theories'. Such theories make no robust claims as to the exact nature of conceptual representation; rather, they speak to the crucial integration of *a priori* world knowledge into concept formation and use. Murphy exposes the inability of traditional prototype or exemplar models of categorization, including contemporary connectionist models, to account for such effects. That traditional conceptual studies have used materials 'as divorced as possible from outside knowledge' (p. 141) in an effort to reflect basic or widely applicable learning principles is troublesome: that is, 'if one is worried that experiments on learning animal categories would not generalize to learning about furniture, how can we be sure that experiments on learning dot patterns generalize to both of them?'

(p. 142). The chapter ends with a thought-provoking discussion of knowledge effects on initial feature construction and the learning process itself, which has strong implications for the study of development (*cf.* Markman, 1989).

Murphy next puts conceptual theories to the test by providing a working model of conceptual structure (i.e. taxonomic organization) and induction. In contrast to, for example, Kiel's (1979) notion of pre-stored hierarchies, Murphy endorses an on-line reasoning process in which hierarchical structure is computed. In his evaluation, exemplar theories appear ill-equipped to handle either hierarchical conceptual structure or induction. Traditional prototype theories fare little better, reinforcing the need for a more encompassing theory of categorization to handle the results to date, and supporting Murphy's increasingly strong case for pursuit of a unified theory of categorization.

Concepts and development

With the necessary background and perspective in place, Murphy turns to what he considers to be the single most important theme of cognitive science: that is, the question of how learners first acquire conceptual knowledge. Overall, Murphy argues that any model of the underlying nature of adult concepts must apply intrinsically to infant and child development, and he recognizes a 'striking similarity to findings in adult literature' (p. 286) in the identified developmental trends. Importantly, Murphy acknowledges the validity of the reverse direction of reasoning: that is, that the pursuit of an adult model may derive more readily from developmental research.

Murphy's review reveals undeniably that infants and young children can and do distinguish objects and form categories very early on. Intertwined throughout are two fundamental questions, which are the very crux of current and historical developmental debates. First, what is the nature of the child's representation of conceptual knowledge? Furthermore, what are the roles of innate versus acquired skills in triggering or supporting such knowledge? Regarding the former issue, Murphy presents both sides of an ongoing debate regarding whether infants first form global (i.e. holistic or superordinate-like) versus more specific (i.e. basic level) categorical representations. In light of robust basic-level category advantages in older children and adults, the proposal of infants' initial global category formation is, he notes, 'puzzling' (p. 295) and a problem for continuity in development. In a similar vein, he examines the reluctance of many researchers to ascribe knowledge effects to children, given their comparatively limited scope of experiences, and counters with a range of detailed examples which he argues suggest that children, parallel to adults, must utilize some level

of *a priori* knowledge in category construction and use. If this were not available, children would necessarily fall back on 'purely empirical learning' (i.e. stochastic sensitivity), which cannot explain, for example, constraints on word learning or the tendency towards essentialism (see pp. 366–9). Many researchers would, of course, argue that there are other alternatives. Some hold at least that the contrast is not so stark (e.g. Smith, 1999*a*; Mandler, 2000; Sinha & Jensen de Lopez, 2000); others claim, for example, that word learning biases ARE learned and emerge from experience (e.g. Smith, 1999*b*; Gathercole, Thomas & Evans, 2000).

With respect to the debate on nature versus nurture, Murphy provides evidence that structural category effects identified in adults (e.g. typicality, basic-level advantages) are reported in the child literature as well. Indeed, whereas the actual content of categories appears to vary across ages and communities as a function of experience, Murphy presents accumulating evidence to support basic or universal principles governing category formation. To explicate these data, he capitalizes on the idea of innately constrained learning (*cf.* Kiel, 1979), such that children are biased inherently toward relatively restricted interpretations of highly complex input.

Concepts and language

Murphy's interpretation of the nature of conceptual development reverberates with a strongly nativist flavour, whereas his expansion to the topic of language at this juncture veers sharply toward the cognitive constructionist perspective of symbolic thought. Although he provides operational definitions of the terms *concept* and *word meaning*, implying a psychologically real boundary between the two, he highlights the similarity, even overlap (e.g. the category of 'nouns' has been shown to abide by typicality effects) between principles of concept use and those of word meaning. He introduces, then quickly discards, linguistic explanations of word meaning following from referential semantics, and instead focuses on the CONCEPTUAL VIEW; i.e. representational word meanings are mapped onto conceptual structures. His position comprises three basic principles: (1) words are overlaid on conceptual structure, thus 'meaning' is built out of contrast, background knowledge, and underlying assumptions, represented collectively via explicitly linked nodes; (2) lexical 'decomposition' is irrelevant, thus the substructure of words is not a component feature list but 'a possibly elaborate structure' (p. 439); and (3) the amount of conceptual knowledge activated by a particular word varies across conditions (i.e. contextual modulation).

Murphy observes the difficulty in accounting for phenomena such as polysemy and contextual modulation via purely linguistic theories (e.g. the

Whorfian hypothesis). In his assessment, cross-cultural data collected thus far are insufficient to demonstrate linguistic determinism and in fact can be re-interpreted to show just the opposite (e.g. if Eskimos have 50 words for 'snow' this is due to nonlinguistic distinctions, thus exemplifying concepts determining vocabulary). The core evidence required for the Whorfian hypothesis would consist of descriptive crosslinguistic differences in conjunction with 'independent demonstrations of parallel conceptual differences' (p. 434); to date, such evidence is lacking (but see, e.g. Bloom, 1981; Levinson, 2000, for strong arguments to the contrary). Accordingly, Murphy argues for language as merely a reflection of conceptual structure, thus conforming to domain-general conceptual universals.

Concepts as complex constructs: new insights

Although the majority of Murphy's book considers concepts as isolated entities, they are most often utilized as components of more complex constructs. Indeed, any endeavour to account for a deep-seated phenomenon, such as the development of conceptual thought, must consider simultaneously the local and global implications of the construct within a highly interactive, embodied cognitive system (*cf*. Thelen & Smith, 1994). The concluding chapters represent Murphy's attempt to account for such effects. He offers the CONCEPT SPECIALIZATION MODEL, which conceptualizes representations as schemata with relevant slots for modifying 'fillers'. His model stipulates the role of knowledge in choosing the best-fitting slots, and allows for subsequent, additional interpretation or elaboration of a concept following selection of a correct slot. The problem here, however, is one of infinite regress: Murphy appears simply to presuppose exactly what he is trying to explain. Although his model importantly addresses the complex and multiplicative nature of conceptual combination, consistent with accumulating evidence of the critical role played by knowledge in almost every aspect of conceptual thought, it does not specify the process by which these aspects are reconciled. Ironically, Murphy addresses this by noting that 'an even broader and more powerful theory of conceptual combination seems called for' (p. 469); the catch with such a model, of course, lies in increasingly remote interpretations of conceptual constructs (i.e. the complexity of the theoretical apparatus introduced to account for the phenomena becomes more and more distant from the phenomena themselves), not to mention the falsifiability of the model. Nevertheless, Murphy's précis that conceptual combination appears 'saturated with casual reasoning and knowledge-based processing', and thus gives rise to 'one of the strongest pieces of evidence for … knowledge approaches' (p. 475), reinforces the overarching theme of his work.

CONCLUSION

Any overview, no matter how comprehensive, constitutes the author's implicitly subjective perspective, if nothing else by virtue of the very issues emphasized. Of this Murphy is sharply aware; therefore, he leads into the final chapter of his book by pointing out the various topics that he was unable to cover in full. The section serves as a useful reminder of the difficulty in accounting for the very wide range of evidence and theoretical stances that have accumulated across the field.

Murphy closes with a concise review of the three theoretical perspectives (exemplar, prototype, and knowledge theories) that crosscut his book, together with their collective strengths and weaknesses. He sums all three approaches as 'a bit suspect', noting the limitations of organizing a field, typified by such breadth and complexity, primarily by disjunctive theories. He identifies three potential avenues of research that require attention: greater modelling efforts (e.g. by prototype theorists), acknowledgement of a wide range of data rather than a single-paradigm focus, and better integration of the knowledge approach with an empirical learning component. Murphy's vision of the future is that a distinct 'knowledge approach' will be subsumed under a broader model in which 'all theories of concepts will include knowledge effects, and the theories will differ in terms of their mechanisms for how knowledge is involved in processing' (p. 498). Thus, the book comes full circle: the most comprehensive theories of conceptual phenomena are seriously lacking with respect to mechanisms by which such inclusive processing is accomplished; yet it is just such all-encompassing viewpoints that are required to explicate and unify conceptual theory.

In summary, this book is a good and sometimes controversial attempt to illuminate the status of the psychology of concepts. Child language researchers who study the development of reference, fast mapping, word meaning, and word classes, to name just a few relevant areas, might well find that this book provides a useful guide to issues in the psychology of concepts, which is sometimes missing from the more child language-based research. Murphy has managed to impart not only the tremendous progress that research on concepts has made to date, but also the humbling notion of what yet remains to be accomplished.

REFERENCES

Bloom, A. (1981). *The linguistic shaping of thought: a study in the impact of language on thinking in China and the West*. Hillsdale, NJ: Erlbaum.

Gathercole, V. C. M., Thomas, E. M. & Evans, D. (2000). What's in a noun? Welsh-, English-, and Spanish-speaking children see it differently. *First Language* **20**(58), 55–90.

Gerken, L. A. (1994). Child phonology: past research, present questions, future directions. In M. A. Gernsbacher (ed.), *Handbook of psycholinguistics*. New York: Academic Press.

Kiel, F. C. (1979). *Semantic and conceptual development: an ontological perspective*. Cambridge: Harvard University Press.
Levinson, S. C. (2000). Yélî dnye and the theory of basic color terms. *Journal of Linguistic Anthropology* **10**, 1–53.
Mandler, J. M. (2000). Perceptual and conceptual processes in infancy. *Journal of Cognition and Development* **1**(1), 3–36.
Markman, E. M. (1989). *Categorization and naming in children: problems of induction*. Cambridge: MIT Press.
Sinha, C. & Jensen de Lopez, K. (2000). Language, culture, and the embodiment of spatial cognition. *Cognitive Linguistics* **11**(1–2), 17–41.
Smith, L. B. (1999*a*). Do infants possess innate knowledge structures? The con side. *Developmental Science* **2**(2), 133–44.
Smith, L. B. (1999*b*). Children's noun learning: how general learning processes make specialized learning mechanisms. In B. MacWhinney (ed.), *The emergence of language*. Mahwah, NJ: Erlbaum.
Thelen, E. & Smith, L. B. (1994). *A dynamic systems approach to the development of cognition and action*. Cambridge, MA: MIT Press.

Reviewed by JAMIE F. MAYER
Department of Speech and Hearing Sciences,
Indiana University