

Book Reviews

Book Review Editor: Werner Bies

HOLYOAK, K. J., & THAGARD, P. (1995). **Mental Leaps: Analogy in Creative Thought**. Cambridge, Massachusetts: MIT Press. 320 p., 0-262-58144-2 (PB), \$15.00.

In this 10-chapter volume the authors, from their viewpoint as cognitive scientists, present a systematic account of analogies and analog reasoning. From the outset let me state that this book is unequivocally about knowledge organization. It is not the kind of knowledge that is contained in documents organized within a traditional library, but rather it is mental knowledge – organized "online" within the human mind. Analogies, like cognitive schemas, are an important type of organizer of mental knowledge.

The book represents a significant advance in analogy theory, yet it is highly readable and not exceptionally technical. For expository support, the authors use a number of lucid examples from everyday experience as well as from a wide range of scientific disciplines.

In the first chapter the basic concepts are introduced. These include: *analogy*, *analogical thinking*, *source and target analog*, *personification*, *correspondence* (between elements), *functions* (of compared elements), *selection* (of a source analog from memory), *mapping* (the source to the target), *evaluating* (the validity of the comparison), and *learning* (from the success or failure of the exercise).

The mental leap (which term is the book's title) is the cognitive act involved in proposing or understanding an analogy. "Like a spark that jumps across a gap, an idea from the source analog is carried over to the target. The two analogs may initially seem unrelated, but the act of making an analogy creates new connections between them." (p.7) Supporting this idea, the authors mention Arthur Koestler's term "bisociation", which the authors describe as "the interlocking of two domains of knowledge previously seen as unrelated or even incompatible." (p.13) The mental leap, then, would be the cognitive act of connecting the two domains – in this context, connecting the source analog with the target.

In chapter 2 the authors elaborate on what they call their *multiconstraint theory*, briefly introduced in chapter 1 as "a very general theory of how a mind can use analogy as a way to extend knowledge in everyday and creative thinking." (p.15) Three distinct but

interrelated constraints in analogical thinking are identified. First, there are similarity insights (seeing similarities between different phenomena). Second, there are *structural* insights (seeing the respective attributive structures of the different phenomena so that judgements can be made regarding the extent to which the two are structurally parallel - i.e. isomorphic). Third, the *purpose* of the analogy must be identified. The authors identify the following as the main purposes of analogies: 1. *explanation* or development of a new hypothesis about a target phenomenon, 2. *problem solving* or planning, 3. *decision making*, and 4. *communication*, as in constructing an argument to persuade or evoking an emotional responses as a literary device

From chapter 3 onward is largely an application of the basic concepts introduced in the first two chapters. Chapter 3 delves into the use of analogical thinking among the primates and particularly the chimpanzee. Chapter 4 focuses on its use in children. In chapter 5 the authors elaborate on analogy-based inferences and relate the three constraints of similarity, structure, and purpose to the success or failure of such inferences. This chapter is especially useful in elaborating and clarifying the concepts introduced in the first two chapters.

Chapters 6 through 9 cover the use of analogies in the main purposes listed above. Chapter 6 focuses on decision-making, chapter 7 on the development of explanations, chapter 8 on hypothesis-formation and scientific discoveries, and chapter 9 on communication. I found chapter 8 particularly interesting in its focus on "Great Scientific Analogies". There, the authors describe the importance of analogies in the discoveries by such scientific figures as Galileo, Christian Huygens, Isaac Newton, Benjamin Franklin, Antoine Lavoisier, James Maxwell, Friedrich Kekulé, and Charles Darwin.

Finally, chapter 10 briefly summarizes the preceding exposition and then covers some primary computational principles involved in analogical thought. The authors briefly trace the historical experience of programming computers to simulate analogical thinking (in artificial intelligence) and outline some of the problems encountered. For example systematic mapping of elements in two domains "is computationally difficult, due to the huge number of possible map-

pings, but it pales in comparison to the problem of retrieving an interesting and useful source analog from memory in response to a novel target analog." (p.251)

In the concluding section, under the heading "The Future of Analogy" the authors ask "Where does analogy go from here?" (p.262) They conclude that analogical thinking will continue to play the extensive, crucial role that it has in the past. They acknowledge that analogical thinking is not without pitfalls (involving false or misleading analogies) but urge that critical analysis is a way to minimize such pitfalls.

They then address the question "what more is required to have a complete scientific theory of human use of analogy?" (p.262) They acknowledge that the "creative construction" of analogies is among the most formidable problems for such a theory. It is often not simply the question of retrieving from memory a ready-made source analog and applying it to the target. Rather, there are significant mental operations which must be understood in conjunction with technical issues such as analogical coherence integrated with "deliberative and explanatory coherence". In short, there is still much work to be done in a variety of fields - psychology, philosophy, linguistics, and computer science - before we have that complete scientific theory of analogy.

I would have preferred to see more explicit definitions of the many analogy-related concepts that are introduced. Too often, the terms are used with only indirect indication of their meaning. They can at last be understood after thorough reading of the material, but personally I find it more meaningful and educationally efficient to see explicit definitions up front.

In addition, it seemed on a number of occasions that the presentation of ideas fell a little short of being systematic and cohesive, sometimes seeming to skip around haphazardly. Considerable material was covered but in a style occasionally lacking in methodical order. Nevertheless, I found the book very informative and thought-provoking. Overall, reading *Mental Leaps* was well worth the effort, and the value of insights far overshadows these shortcomings.

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BURKLE-YOUNG, FRANCIS A., & MALEY, SAUNDRA ROSE (1996). The Art of the Footnote: The Intelligent Student's Guide to the Art and Science of Annotating Texts. Lanham, MD / London: Univer-

sity Press of America. XIV, 151 p., 0-7618-0347-5, 0-7618-0348-3.

GRAFTON, ANTHONY (1995). Die tragischen Ursprünge der deutschen Fußnote. [The tragic origins of the German footnote]. Aus dem Amerikanischen übersetzt von H. Jochen Bußmann. [Translated from the American by H. Jochen Bußmann]. Berlin: Berlin Verlag. 228 p., 3-8270-0159-5.

LÜTKEHAUS, LUDGER (1994). Unfröhliche Wissenschaft: Die Lage der Geisteswissenschaften aus der Sicht der Fußnote. Eine längere Anmerkung. [The state of the humanities from the point of view of the footnote. A longer note]. (Nebensachen und Seitenblicke, 1). Marburg: Basiliken-Press. 25 p., 3-925347-28-3.

"You have to write everything that is important in your main text; everything that is not important does not even belong in your footnotes." This was the advice my supervisor often repeated as I was writing my dissertation. Obviously, he did not like footnotes, particularly the footnotes of his doctoral candidates. According to his opinion, we were unable to organize the knowledge of our texts properly, and the most salient indication of this misorganization was our footnotes, which supposedly contained knowledge with no relevance to our prospective readers. Since this time I have been very reluctant to use footnotes in my own texts and I have been very critical about the footnotes of other authors. Thus the advice of my supervisor has continued to haunt me when dealing with the problem of annotating texts.

Ludger Lütkehaus, the author of "Unfröhliche Wissenschaft" shows an attitude towards footnotes which is even more critical than that of my supervisor. In his extremely polemic essay on footnotes in German humanities ("Geisteswissenschaften"), he denounces footnotes as absolutely superfluous, as far as the understanding of the main text is concerned. He makes the point that footnotes in the humanities serve as the *singularly most* important proof of the scientific nature of the humanities. Without footnotes there would be no difference between a journalist and scientist. However, for Lütkehaus, footnotes, in fact, do not *really* contribute to the scientific nature of texts in the humanities. Instead footnotes serve their creators in achieving academic status and receiving research grants. In this sense, footnotes are not concerned with epistemological questions but with questions of social recognition in an academic community. Lütkehaus has some good reasons¹ for his irony and sarcasm, but his approach is completely destructive. For somebody who wants to know how footnotes can properly contribute to the organization of knowledge, he offers no answers.