

## **Book Reviews / Comptes Rendus**

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Kaufman, J., Ewing, M., Montgomery, D., Hyle, A., & Self, P. (2003). *From Girls in their Elements to Women in Science: Rethinking Socialization Through Memory-Work*. New York: Peter Lang. Pages: 184. Price: \$29.95 USD (paper).

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*From Girls in their Elements to Women in Science* is a book written by five women academics who formed an intellectual and emotional community to engage in what they termed “radically different research” from January 1994 to May 1996. They selected a methodology called memory-work to collectively examine how they had been socialized and how they participated within a culture because of their socialization. Specifically, Kaufman et al. chose to examine their socialization in relationship to nature and science, because of their careers in science. The guiding question Kaufman et al. asked at the outset was “What can memory-work tell us about our relationship to nature and therefore to science?” (p. 2). The authors used Crawford et al.’s (1992) strategies for memory-work including reading memories aloud, asking questions, clarifying details present and missing, and adding needed context. Together, the authors generated approximately 90 memories in response to the

cues air, earth, fire, water, and tree, and subsequently used these memories for analyses. Through detailed analyses of childhood, adolescent, and adult experiences in nature, the group discovered what they name a “personal science” (p. 3). Ultimately, the authors conclude that they altered their relationship to traditional science as a result of recognizing their “personal science” within this research project.

Kaufman et al. primarily ground their research in the work of Haug (1987), Vygotsky (1978, 1986), Wertsch (1991), and Rogoff (1990). Interestingly, the authors suggest that Haug’s (1987) theory of memory-work takes social constructivism a step further than Vygotsky and his successors. They argue that through memory-work, theory and experience are brought together in order to personally and collectively see how individuals come to tell particular stories of their lives. Overall, the authors assert that memory-work has led them “to think differently about our relationship to nature, what counts as knowledge, and our own lives as scientists” (p. 6).

Three central ideas emerge as critical to understanding the study described in *From Girls in their Elements to Women in Science*. The most prominent contribution seems to be the idea of a personal science. The authors note, “in analysis we discovered that as children we engaged in what we have come to call personal science” (p. 133). Moreover, “this is a science that produces an embodied knowing... our embodied experience led to a physical knowing of the natural world” (p. 133). However, “as we grew older we lost some of our power in nature and forgot our personal science. We were taught in school a science that was almost exclusively structured by others...” (p. 130). This issue of a personal science is a very powerful idea to ponder further. What if, for example, children were taught to recognize, develop, and articulate a personal science at an early age in school? Teacher educators might also consider how they can help future teachers identify with a personal science before they begin teaching. Perhaps a much larger issue is the lack of relationship to nature in general, particularly for children and adults who grow up

in urban environments. The authors put it this way, “we come to accept and adhere to the prevailing idea that nature is separate from who we are” (p. 132). It may be important for educators to ask what kinds of embodied experiences might help girls and boys, as well as women and men, relate to nature and recognize and rejoice in their personal science. “The recognition of a personal science has clear implications for how we educate children, and it has implications for us as college educators” (p. 138). The reader is left to wonder what Kaufman et al. hint at with this quote.

The second key idea of school science for girls links directly to the development and sustenance of a personal science. The authors draw attention to the American Association of University Women (AAUW) report that girls begin to lose confidence and interest in math and the sciences in adolescence. Moreover, they point to “the ‘valley of death’ in education when girls in grades 4 through 8 are in subtle and not so subtle ways discouraged from pursuing science and engineering science in school” (p. 22). Undoubtedly, the authors highlight the role of school science in their socialization as they examined their memories. Yet they only hint that something might change in schools. For example, Kaufman et al. assert, “the anxiety of girls performing the tasks of laboratory science reflects the indivisibility of the demands of the setting and their emotional reaction to it” (p. 82). However, they do not make any suggestions about how schools or teachers might address such anxieties. It appears critical that teacher educators and future teachers carefully think about the learning environments they create for participation in science. Simultaneously, it may be important for educators to regularly inquire into the emotional element of participation or non-participation in science classes. What if girls and boys were encouraged to discuss science as part of the course, for example? Additionally, Kaufman et al. signal that university teaching is lacking by stating that the “prime reason (90%) for leaving science, given by both men and women, was that they had lost interest, and about 90% of both men and women who switched cited poor teaching

by science faculty as a concern” (p. 21). Overall, how science is taught from elementary through to university emerges continuously throughout the book as a topic requiring attention.

Finally, the third topic or idea vital to the book is women in science. The question of what counts as science is examined from several angles. Kaufman et al. note, “women are pointing out other kinds of science, for example, the science of women’s kitchens and gardens (Hubbard, 1988)” (p. 20). Similarly, the authors suggest a “curious distinction between elite science and the science of women’s gardens, kitchens and nurseries” (p. 47). Notably, “only recently has women’s domestic medicine been recognized” (p. 47). Once again, though Kaufman et al. signal that women’s science seems to be undervalued and recognized, they do not propose any ideas about how to change such perceptions. Interestingly, their memory-work study reveals that family played a crucial role in their relationship to nature. In particular, they point out that for them, fathers symbolized the main connection with nature and they had fewer memories of mothers as doing/involved in science. Are the authors suggesting that parents might actively help girls develop a personal science at home?

What is most interesting is the potential this book raises for questions not yet asked or pursued. The connections to science education are suggested, but not developed. Science education has not been spectacularly successful at transforming science in schools, despite massive reforms and more than enough research to propose alternate teaching strategies. For example, guidelines for science education in Canada and the USA emphasize doing science in schools. The actual physical practice of students generating their own questions and carrying out their own investigations is paramount. Kaufman et al. point out, “opportunities to practice, to learn how to do specific skills, and to demonstrate them were important in our developing relationship to nature” (p. 128). The challenge of how to structure an active science-learning environment requires responses by elementary, secondary, and university educators of science.

Early in the book the authors state, “finally, we discuss how we have been transformed through memory-work and how these transformations have worked their way into our teaching and research” (p. 8). Unfortunately, the reader learns little about what the authors teach or how they applied what they learned from memory-work in their teaching. Also, although Kaufman et al. indicate this work transformed them, they provide no examples or details of exactly what they mean by this transformation. Regrettably, only one page titled “Emerging Questions” provides some insights into the possible implications of this study. Similarly, only one page titled “Transformations” provides a very general description of how this long-term study impacted on the lives of these five women academics. It would have been informative to know more about if and how their memory-work research study impacted on the educational settings where they subsequently engaged in research with teachers and school administrators. Additionally, it would be interesting to learn more about the 90 memories selected for this study. For example, how many of the memories were childhood memories and how many were adult memories? Moreover, did each person contribute the same number of memories and to what extent did their memories differ?

Nevertheless, Kaufman et al. have written an intriguing book based on approximately eight years of academic collaboration (two-year study, analyses & writing). They reference a wide range of literature across disciplines prompting readers to consider new avenues and connections. The following question raised in the book remains as an invitation to science educators at all levels, parents, and scientists: “What does creativity in play have to do with science?” (p. 85).

