I was delighted to be asked to review Xenia Denos’ book, based as it is on the literature review of her Ph.D. thesis for which I was external examiner. In turn, I was honoured to be asked to perform this role, as I had followed with interest and growing admiration the development of Xenia’s research from her first conference presentation onwards. First of all, therefore, I would like to congratulate her on the publication of this book which adds considerably to our knowledge of research into graphicacy and should become essential reading for anyone with a deep interest in the field. This book should be of considerable interest and importance to art educators and to anyone interested in overall child development, as well as to those within the design and technology world.

The format of the book
Well done Loughborough Design Press. The book is attractive and the layout is clear and user-friendly. The range of graphics used throughout the book, from photographs, examples of student work, to schematics and tabulation, all aid comprehension and readability. This range might be seen as expected for a book on graphicacy but many publishers fight shy of reproducing so many images on the basis of expense. The use of colour throughout also adds to the quality feel of the publication. There are, unfortunately, more than a few typographical errors and at least one conflict of attribution between diagram and text. A really close final editing was needed.

Xenia has had access to major UK-wide drawing projects and exhibitions that have aimed at promoting drawing in innovative ways, from which illustrations have been drawn. The support of Ken Baynes for her research and its publication is evident.

Ken Baynes’ introductory essay
What higher endorsement and accolade could an author, writing about graphicacy, receive than to have a substantial essay by Ken Baynes to preface their work? Usually prefaces by an authority in the field run to a 1,000 word (at most) endorsement of the work. What Ken has provided, however, is a historical overview of the development of human graphicacy from earliest times to the modern day, focussing on the way in which technical drawing and engineering practice have developed in tandem since the Renaissance. This essay forms a backdrop to Xenia’s work, highlighting the importance of graphicacy education in a modern technological society.

Book structure and content
The book is divided into three major sections (“Graphicacy and Education”, “Progression and Development of Graphicacy” and “Graphicacy and Student Learning”) followed by a much shorter “Aftermath” in which Xenia introduces her own taxonomy.

Each section is clearly structured and the use of tabulation and schematic diagrams help the reader to navigate through the in-depth summaries of the research conducted by previous researchers and designers of graphicacy tests. This tabulation is used effectively both to summarise the work of individual researchers and to compare their findings and conclusions.

Her discussion of research conducted in each area has both depth and breadth, as one would expect of a book based on a Ph.D. literature review. Her critique of her sources is measured, usually indicating where there is agreement or disagreement between them, rather than expressing her own view as to their validity. This is exemplary practice in a Ph.D. but maybe a reader of her...
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Book would prefer a stronger sense of Xenia's own viewpoint. A weighing-up of the graphics tests, especially, would have been useful rather than presenting these without analytical comment.

The international range of Xenia's review is impressive. It is a major achievement to have brought together research carried out across the world. As well as the best-known large stage studies carried out in Western societies, she quotes search conducted in both north and south Africa and in Japan. Problems of cross-cultural application are thereby mitigated by these references, which have been a short-coming with previous, well-known research that has been conducted only in a single Western culture. More research is needed, however, across the globe before claims of universality of graphic capabilities can be validated. Xenia avoids making such generalisations herself but does not always make the cultural specificity of her sources clear in terms of historical context.

Towards the end of her overview, Xenia provides a tabulated summary identifying the degree to which different aspects of graphicacy have been researched. This has potential to be the starting point for future researchers, giving a clear indication of where gaps in research exist.

Unfortunately, she does not provide an in-depth treatment of her own taxonomy. Is this the subject of book 2? She says, modestly, that this is a “work in progress” and perhaps, therefore, feels that she is not yet ready to publish her findings. The taxonomy is included, at the very end of the “Aftermath” with so little comment that it could easily be overlooked. Work in progress or not, Xenia has missed an opportunity here. Her taxonomy addresses gaps in previous knowledge, especially in older childhood that could most usefully have been discussed in more detail. This taxonomy is her major contribution to new knowledge. I look forward to its publication in her next book.

The effect of IT on graphicacy
Xenia does not really develop the impact of digital technology and how this may be changing children's cognitive development and hence graphic capabilities. The classic studies of Fry, Kellogg, Lowenfeld, along with the work of Piaget, were all conducted before the digital revolution. Not only do children in UK Primary schools have access to digital graphics packages, but increasingly to tablets with high graphics capabilities; their teachers use interactive whiteboards in many (if not most) lessons, often utilising resources with high graphic impact. Given its detail and scope, Xenia's work could be useful to any researcher wishing to make comparisons between the achievements of the children of the digital age and those of 2 previous generations.

The most important points made in the book
The ubiquity and high importance of the use of graphics. That they can represent both quantitative and qualitative information, and that children need to be taught how to both read and use graphics for a diverse range of functions.

More research is needed; I await the publication of the book of Xenia's own empirical work with her own taxonomy central. Danos' Taxonomy ought to become one of those cornerstones of graphicacy research that everyone knows and quotes.