Chapter 9
General Conclusions to Part I

9.1 Key Findings from Part I

As was mentioned in Sect. 1.4, Part I has reviewed diverse studies using diverse methods of data collection, and this precludes any formal meta-analysis to integrate the findings. One must instead focus on the most common finding—the *modal* finding—regarding the legibility of serif and sans serif typefaces: superiority of serif typefaces; superiority of sans serif typefaces; or no difference.

The research question is whether there are differences in the legibility of serif and sans serif typefaces when they are used to generate printed material. The modal finding from the research studies that have been reviewed is that there are not. This applies to four out of six experiments on reading letters and words (Sects. 4.1 and 4.3); the two Korean studies yielded contradictory results. It applies to five out of six experiments on reading sentences (Sect. 5.1; see also Sects. 6.1 and 6.2) and to all four experiments on the comprehension of text, whether using measures of speed or accuracy (Sect. 5.2). It also applies to all eight experiments on the reading capability of younger readers and to two of the three experiments on the reading capability of older readers (Chap. 7). Two studies have been cited in support of the supposed superiority of serif typefaces, but these can be discounted: one failed to report any empirical data on the issue (Burt, 1959; Burt et al., 1955), and the other suffered from irredeemable methodological problems (Wheildon, 1990, 2005).

It is unfortunate that there has been relatively little work on the legibility of serif and sans serif typefaces in readers with disabilities as opposed to their subjective preferences for different kinds of typeface (Chap. 8). Two studies found no difference in legibility between serif and sans serif typefaces (Pittman, 1976; Rubin et al., 2006). One found a superiority for serif typefaces among children with congenital visual impairment (Nolan, 1959), but this study seems to have suffered from methodological problems. A fourth study found a superiority for sans serif typefaces among patients with aphasia (Wilson & Read, 2016). It is generally assumed that sans serif typefaces are more appropriate for people with aphasia, and there is an urgent need for more research to evaluate this assumption. Finally, two studies have found that the reading

J. T. E. Richardson, *The Legibility of Serif and Sans Serif Typefaces*,
SpringerBriefs in Education, https://doi.org/10.1007/978-3-030-90984-0_9

performance of children with dyslexia does not differ between serif and sans serif typefaces when they are matched in terms of the spacing of the letters.

9.2 Preferences and Connotations

With regard to research studies concerned with readers' preferences between serif and sans serif typefaces and the connotations of the two kinds of typeface, the modal finding is that among adult readers there is no overall preference between serif and sans serif typefaces, nor any overall difference in the connotations of serif and sans serif typefaces (Sect. 5.4). Even so, there is a suggestion that readers' preferences and the connotations of serif and sans serif typefaces may vary between different contexts (see Schriver, 1997, pp. 289–303; Zachrisson, 1965, pp. 156–62). This has major implications for educational publishing and educational assessment:

- For authors, editors, and publishers of books in many fields, any such differences will be mainly of commercial relevance. However, authors and editors of academic articles (and of books, too, in the humanities) will want to be assured that their work is evaluated in terms of its content rather in terms of its typographical appearance. This provides a far more logical reason for requiring that manuscripts should be submitted for publication to academic journals and publishers in a standard typeface than simply asserting that one kind of typeface is more legible than another.
- The issue of fairness is especially relevant in the context of academic assessment. It is possible that teachers and other assessors will give more positive evaluations of students' assignments if the teachers and students share the same typographical preferences than if they differ in those preferences (although there seems to be no empirical evidence on this matter). It would be useful if teachers who are responsible for particular course units (and, ideally, for entire degree programmes) could agree on their typographical preferences and make these known to their students.

There is a need for research on whether reviewers' evaluations of academic manuscripts and teachers' evaluations of students' assignments are affected by their own preferences and expectations. Nevertheless, the available evidence suggests that these variations in readers' expectations and preferences depend on their prior experience and familiarity with different typefaces and not on any intrinsic properties of the typefaces themselves. Indeed, the results that were obtained by Uysal and Düger (2012) indicate that even readers who are visually impaired will find most typefaces relatively congenial after a gradual period of exposure.

9.3 Implications for Previous Assumptions

Where does this leave previous assumptions about the legibility of serif and sans serif typefaces? There is no support for traditional beliefs that serif typefaces are superior to sans serif typefaces and certainly no support for Morison's (1959) assertion that "the serif is essential to the reading of alphabetical composition" (p. xi). Regarding the American Psychological Association's (2010) insistence that a serif typeface "improves readability and reduces eye fatigue" (pp. 228–229), Perea (2013) remarked: "There are no well-founded theoretical reasons to use of [*sic*] a serif font over a sans serif font—beyond subjective preferences" (p. 16). To this one might add: and there is no convincing empirical support, either.

The assertion contained in *Merriam-Webster's Manual for Writers and Editors* (1998) that "studies of typeface legibility have tended to demonstrate that standard serif typefaces can be read somewhat more easily and quickly than standard sans-serif typefaces" (p. 330) is factually incorrect. Finally, the length of the reference list at the end of this book contradicts Kullmann's (2015) statement that there have only been "sporadic" studies on this issue (p. 1), and one can certainly dismiss his assertion that previous research has not led to any clear conclusion. On the contrary, based on the wealth of evidence that has accumulated over the last 140 years, the clear conclusion is that there is no difference in the legibility of serif typefaces and sans serif typefaces when they are used to produce printed material.

9.4 The American Psychological Association's Current Position

The guidelines in the sixth edition of the Association's *Publication Manual* followed those in previous editions. However, a seventh edition was published while this monograph was being written; the new guidelines have already been adopted by the American Educational Research Association and are likely to be adopted by other organisations in the future. This seventh edition takes a rather different approach (American Psychological Association, 2020):

> APA [American Psychological Association] Style papers should be written in a font that is accessible to all users. Historically, sans serif fonts have been preferred for online works and serif fonts for print works; however, modern screen resolutions can typically accommodate either type of font, and people who use assistive technologies can adjust font settings to their preferences. Thus, a variety of font choices are permitted in APA style. . . .
>
> Use the same font throughout the text of the paper. Options include
>
> - a sans serif font such as 11-point Calibri, 11-point Arial, or 10-point Lucida Sans Unicode or
> - a serif font such as 12-point Times New Roman, 11-point Georgia, or normal (10-point) Computer Modern....

> We recommend these fonts because they are legible and widely available and because they include special characters such as math symbols and Greek letters. (p. 44)

An accompanying background paper confirms that the focus of the new guidelines is on the accessibility of typefaces for users with disabilities rather than on their legibility per se (Accessibility, 2020). The paper also refers to the Web Content and Accessibility Guidelines produced by the World Wide Web Consortium, suggesting that it is concerned with reading from screens rather than reading from paper, although this is not made explicit. With regard to the legibility of serif and sans serif typefaces, the paper makes the following statement:

> It is a common misconception that serif fonts (e.g., Times New Roman) should be avoided because they are hard to read and that sans serif fonts (e.g., Calibri or Arial) are preferred. Historically, sans serif fonts have been preferred for online works and serif fonts for print works; however, modern screen resolutions can typically accommodate either type of font, and people who use assistive technologies can adjust font settings to their preferences.
>
> Research supports the use of various fonts for different contexts. For example, there are studies that demonstrate how serif fonts are actually superior to sans serif in many long texts (Arditi & Cho, 2005; Tinker, 1963). And there are studies that support sans serif typefaces as superior for people living with certain disabilities (such as certain visual challenges and those who learn differently; Russell-Minda et al., 2007). ("Myth 1," paras. 1–2)

The choice of reference citations in this statement is rather odd. First, in discussing different styles of typeface, Tinker (1963, pp. 46–48) referred to the study by Paterson and Tinker (1932), who used a speed-of-reading test to measure the legibility of each of ten typefaces. Seven were serif typefaces that had been nominated by a large number of editors and publishers as being worthy of study, of which Scotch Roman was used as a benchmark. The results showed that "type faces in common use do not differ significantly" (Tinker, 1963, p. 48). The other three were chosen in order to be "radically different" (p. 46): Kabel Light, a sans serif typeface; American Typewriter, a slab serif typeface that imitated typewriting; and Cloister Black, an elaborate serif typeface. Both American Typewriter and Cloister Black were read significantly more slowly than Scotch Roman, but Kabel Light was not. Tinker concluded: "Type faces in common use are equally legible.... A serifless type, Kabel Light, is read as rapidly as ordinary type" (p. 64). In other words, Tinker (1963) did *not* show that serif typefaces were superior to sans serif typefaces. Indeed, in a subsequent annotated bibliography, Tinker (1966, p. 84) strengthened his conclusion in the light of research findings since the study by Paterson and Tinker (1932): "Typefaces in common use are equally legible. This includes the typefaces with serifs and those without serifs."

Second, in addition to the study by Arditi and Cho (2005) that was mentioned in Sect. 5.1 and involved the presentation of "scrambled" text, these researchers carried out an experiment where they asked just four participants to read aloud individual sentences. The sentences were presented one word at a time on a computer screen. Arditi and Cho found no difference in performance between sentences in a slab serif typeface and sentences in a sans serif typeface. It should be noted that they did not make use of "long texts". However, the main point is that, once again, Arditi and Cho did *not* show that serif typefaces were superior to sans serif typefaces.

Third, the review by Russell-Minda et al. (2007) on the legibility of typefaces for readers with visual impairment covered both research on reading from paper and research on reading from screens. They did indeed conclude: "Sans serif typefaces, such as Arial, Helvetica, Verdana, or Adsans, are more readable than is Times New Roman, for example" (p. 413). However, this was not supported by the evidence that they described: they cited eight studies, of which six had found no significant difference in legibility between serif and sans serif typefaces. In fact, their abstract stated, "Research has not produced consistent findings" (p. 402). Moreover, in the original report on which their published review was based, Russell-Minda et al. (2006) had arrived at a very different conclusion: "Based on results from existing studies, the effects of the presence or absence of serifs on text legibility seem to be inconclusive" (p. 23). In short, they definitely did *not* demonstrate that sans serif typefaces were superior for people living with certain disabilities.

In other words, each of these three reference citations is in error because it fails to support the statement to which it is attached. In the bibliographic research literature, these are referred to as "quotation errors", although they include indirect quotations, paraphrases, and summaries as well as direct quotations. Mertens and Baethge (2011) demonstrated that around 20% of reference citations in the medical and bioscience literature were quotation errors, but it is clearly unfortunate that such errors should occur in a document published by the American Psychological Association.

9.5 Conclusions

This chapter concludes Part I by summarising and discussing the key findings. Are there any differences in the legibility of serif and sans serif typefaces when they are used to generate printed material? The modal finding from the research studies that have been reviewed is that there are not. Two studies in particular have been cited in support of the superiority of serif typefaces, but these can be discounted on scientific grounds. Are there any differences in readers' preferences and connotations between serif and sans serif typefaces when they are used to generate printed material? The modal finding is that there is no overall preference between serif and sans serif typefaces, nor any overall difference in their connotations. Even so, there is a suggestion that readers' preferences and the connotations of serif and sans serif typefaces may vary between different contexts, and the chapter discussed the implications of this for educational publishing and educational assessment.

The chapter considers the relevance of the findings for previously stated assumptions about the legibility of serif and sans serif typefaces. The traditional view that "everybody knows" that serif typefaces are easier to read on paper than sans serif typefaces is clearly untenable, since this view has never been supported by sound empirical evidence. Finally, the chapter concludes by assessing the position that is adopted in the seventh (2020) edition of the American Psychological Association's *Publication Manual*. The position confounds research on reading from paper with research on reading from computer screens, and the background paper on which it depends suffers from several quotation errors (that is, reference citations that do not support the statements to which they are attached).