

TRENDS AND APPROACHES IN CARTOGRAPHIC TEXTBOOKS WITH AN EMPHASIS ON THE GRAPHIC VARIABLES

FORREST D.

University of Glasgow, GLASGOW, UNITED KINGDOM

Unlike many academic subjects, cartography has been characterised by a relatively small number of general textbooks over the years. This paper forms part of a review of key textbooks of the last 50 years with the aim of identifying trends in content and approach to the subject. One fundamental element of cartographic design investigated is the treatment of the graphic (or visual) variables which, together with an analysis of the range of types of maps and mapping covered, forms the core of the review. Map making technology has changed dramatically over the time period studied and the influences of this cannot be ignored as a contextual environment for cartographic design & production, but is not a major feature of the review.

The description of the visual variables, or graphic semiology, has become much more refined in textbooks over the years (table 1). Several early textbooks simply describe variations in symbols in a rather general manner, perhaps in terms of form, dimension and colour, but gradually these terms have been developed into more comprehensive sets of variables. Increasingly textbooks tabulate the variables and provide illustrations of their use in point, line and area symbols. In this context it is clear that a major influence is the work of Jacques Bertin in the 1960s. His influence on North American textbooks starts to appear in the 1980s, some time after its publication and apparent influence in Europe, but probably relating to the translation and publication of his work in English.

Discussion of pattern and texture, mainly applied to area symbols, is the aspect that leads to the greatest variation in treatment, which includes several variations of how Bertin's term 'grain' is translated into English and incorporated into these schemes. For many years the writer has been sceptical about the appropriateness of Bertin's 'Position (2PD)' as a graphic variable appropriate for cartography, it being generally more applicable in other areas of graphic design where one is not trying to represent geospatial location. This view has probably had more to do with how it has been incorporated into the discussion of graphic variables in some textbooks, than to Bertin's original intention. However, some recent examples of have altered the writer's view the applicability of this variable, which is discussed with relevant examples.

Subsequently, authors have added further graphic variables, such as 'focus', and others have attempted to subdivide several of Bertin's variables to create a much more detailed classification. Some of these possibilities are discussed, along with examples of how some less commonly used graphic variables, such as colour saturation, have been suggested as an appropriate solution to conveying additional information, such as data quality.

In addition to overall trends in content and approach the review also compares the focus of UK and European (English language) texts with those by North American authors. Preliminary investigation indicates a different emphasis, with those from North America concentrating much more on statistical mapping than those from the UK, which tend to take a broader view of mapping types. The author's experience as both student and teacher of cartography in UK and Canadian geography departments provides first hand and anecdotal evidence of such different approaches to the teaching of the subject.

	date	number	position	form	orientation	dimension	hue	lightness	saturation	pattern	texture	pattern orientation	other
Bertin	1967	7	position	form	orientation	taille	couleur	valeur			grain		
Robinson 3 rd ed	1969	6		shape		size	hue	value	intensity	pattern			
Keates 1st ed	1973	6+2		form	<i>orientation</i>	dimension	hue	lightness	saturation	pattern	<i>texture</i>		
Morrison	1974	8		shape		size	hue	value	intensity	p. arrangement	p. texture	p. orientation	
Robinson 4th ed	1978	6		shape	direction	size	colour	value		pattern			
Robinson 5 th ed	1984	6+3	<i>location</i>	shape	orientation	size	hue	value	<i>chroma</i>		spacing		<i>focal quality</i>
Dent 1 st ed	1985	8		shape		size	hue	value	intensity	p. arrangement	p. texture	p. orientation	
Keates 2 nd ed	1989	6+2		form	<i>orientation</i>	dimension	hue	lightness	saturation	pattern	<i>texture</i>		
MacEachren	1991	9		shape	orientation	size	hue	value	saturation	arrangement	texture		focus
MacEachren	1994	10	<i>location</i>	shape	orientation	size	hue	value	saturation	arrangement	texture		focus
Robinson 6 th ed	1995	9		shape	orientation	size	hue	value	chroma	p. arrangement	p. texture	p. orientation	
Kraak & Ormeling 1st ed	1996	6+1		shape	orientation	size	colour	value	<i>saturation</i>		grain		
Dent 5th	1999	8		shape		size	hue	value	saturation	p. arrangement	p. texture	p. orientation.	
Slocum 2nd	2005	9		shape	orientation	size	hue	lightness	saturation	arrangement	spacing		perspective height
Brewer	2005	8		shape	angle	size	hue	lightness	saturation	arrangement	separation		
Slocum 3rd	2009	9		shape	orientation	size	hue	lightness	saturation	arrangement	spacing		perspective height

Number = the number of variable described (primary + secondary); *italics* = secondary variable

Table 1. Graphic variables described in various cartographic textbooks.