The combination of different formulae based on different arithmetic principles can sometimes alter seriously the consistency of the whole system. Lévi-Strauss observed:

> As has been emphasized by certain authors, many systems defy all attempts at classification. They make up certain numbers by aggregation and change the formula according to whether the numbers are less than or equal to 10, between 10 and 20, or over 20. Some seemingly identical systems build up the numbers from 6 to 9 and those expressing tens, either by addition or subtraction. (1990[1968]: 336)

French offers a good example of deviance from the base-10 system, which illustrates a change in the formula. For instance, the word for 87 in French is *quatre-vingt-sept* ('four-twenty' and 'seven'), clearly derived from a cyclic pattern with a base of 20. Furthermore, for any number between 80 and 99, the grouping is expressed as a multiple of 20. Thus there are two inconsistent systems that coexist in French: the base-10 decimal system and a base-20 system, probably originating from an older underlying Celtic system. As Crump pointed out: 'The deviant cases often represent lexical survivals' (1990: 36). In fact there is no mathematical reason why French uses a base-10 system for number 60 whereas it uses a base-20
p. 328 system for number 80. It is not a matter of mathematics, it is a matter of history. There is ↳ still a generalization available: that the larger base is used for the larger numbers (and not vice versa). Nevertheless, there is no general and 'palpable' principle able to explain why 60 is not named *trois-vingt* ('three-twenty'); nor is the decimal naming *septante*, *octante*, and *nonante* used in France for 70, 80, 90 whereas it is in other French-speaking countries (such as Belgium).

14.4 Measurement of Time, Weight, and Distance in Relation to Practical Constraints

The measurement of time in traditional societies does not necessarily rely on number words. Frequently it is related to the principal activities of the day. Zaslavsky gives examples among the Ankole from Uganda where one talks about 'milking time' (6 a.m., *akasheshe*), 'resting time' (12 noon, *bari omubirago*), 'drawing water time' (1 p.m., *baaza ahamaziba*), 'drinking time' (2 p.m., *amazyo niganywa*) (Zaslavsky 1973: 260). When people in traditional societies reckon time they have to deal with the notion of succession, which implies the possibility of a systematic order based on uniform events. Such events can be of a social nature (natural life cycle between birth and death) or of a physical one (nights and days, seasons). As soon as they return, these events determine a periodic cycle, and its duration can be taken as a reference value for reckoning time. It must be stressed that this value needs not be of a numerical nature. Crump introduces a distinction between linguistic and arithmetical aspects of the measurement of time:

> The linguistic system is concerned to name different, and possibly recurrent, points in time, whether these be days, years, or whatever, whereas the arithmetical system measures the lapse of time, again in different units, according to the end in view. The former is characteristic of 'traditional' time, where it is above all important to begin the harvest or observe a festival at the correct time. The latter is pre-eminently an institution of the modern world, in which the use of accurate clocks has enabled time to be equated with other numerical factors, such as distance or money. (Crump 1990: 83)

The events most suitable for the measurement of time are the position of the sun, the moon, the planets, and the stars. The periodic movement of these heavenly bodies in the cosmos is the basis for the reckoning of long time durations. Crump notes: 'This provides the starting point for a system of numeration based on the mathematical theory of congruences, which has been used for counting different units of time—from hours to units comprising several years—in many quite unrelated cultures' (1990: 84). It is not so easy to