Another fascinating activity that led people to measure distances on a much greater scale is the sea travel of navigators from the Central Caroline Islands of the north Pacific. Their ability is known to us thanks to the work of Gladwin (1970). He pointed out the amazing skill developed by each navigator

> in judging the speed of his canoe under various conditions of wind, a skill sharpened by long experience, and his attention to the time which has passed as shown by the movement of sun and stars. Strictly speaking, it is not proper even to speak, as I did, of the number of miles the navigator has travelled. In our speech we find it natural to estimate (or measure) distance in arbitrary units. For a Puluwatan the estimate is relative. It is akin to a person walking across a familiar field in the dark. (Gladwin 1970: 184)

There exists a cognitive dimension in this practice that is not of a mathematical nature, since it relies on principles not fully explicit, thus not emanating from the 'mathematical mind'.

14.5 Experimental Task for Accessing Non Verbal Numerical Knowledge

It is important to point out that the use of language may involve the manipulation of numbers without explicit number words to designate them. In fact, as observed by Schmidl: 'The absence of counting words by no means indicates a lack of counting concepts, since the number concept and the designation for the numbers need not always coincide' (Schmidl 1915: 196, translated by Zaslavsky 1973: 14). Zaslavsky studied
p. 331 African counting systems and observed that standardized ↳ gestures often accompany, or even replace, the number words, sometimes in relation to a taboo on counting living creatures (Zaslavsky 1973: 7). In the marketplace, for instance, the prices are indicated by moving the fingers. She recorded various systems of gestures by taking a series of photographs (published in Zaslavsky 1973: 243–5, 249–51). Among the Shambaa of northeast Tanzania, some numbers are named on the principle of two equal terms. The number six is named *mutandatu* as the result of adding two equal quantities 6 = 3 + 3. To illustrate this, she gives a picture of a man showing the last three fingers of his two hands (p. 30). The same holds for eight, which is named *ne na ne*' as the result of adding 8 = 4 + 4. She remarks that during fieldwork, when one has to record properly the gesture involved in the representation of numbers, 'only motion pictures can do justice to this gesture' (p. 241). (See also Seyfeddinipur, Chapter 7 above.)

In many languages all over the world there exists evidence of a former use of gestures for expressing numbers in ancient counting systems. The name for 'five' often comes from the number of fingers on a person's hand. The corresponding word is often the same as 'hand', and in some languages where twenty is used as a base, the name for it is 'man complete', which means 'ten fingers of both hands and ten toes of both feet'. Lévi-Strauss gives examples from Mexico and Central America where twenty is the 'complete number': 'It was referred to by a word meaning "a body" in Yaqui, "a person" in Opata, "a man" in Maya-Quiché and also in Arawak, so that the practice extended also to the northern regions of South America' (Lévi-Strauss 1990[1968]: 336). Note that conversely, the word for 5 can be used to designate the hand as in English, where a 'high five' means a hand gesture that occurs when two people simultaneously raise one hand and push the flat of their palm against the one of their partner. The same holds in Madagascar, where young people sometimes replace the word 'hand' by the world 'five' (*dimy*) in expressions such as '*Raiso ny dimy*', which means 'Let us beat one's hand', that is to say 'Agreed'.

Recent work on the subject of numerical abilities in various cultural contexts tends to prove that sophisticated competence can be present in the absence of a rich lexicon of number words. We will give examples that are interesting for our purpose because they illustrate the use of new technologies in fieldwork research, namely computerized experiments. It concerns numerical cognition in native speakers